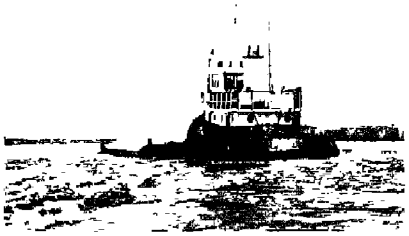
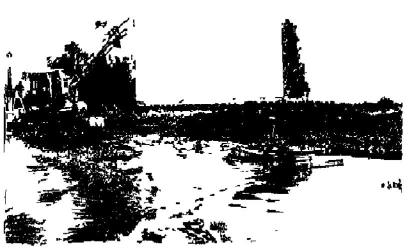
a process for coastal resource management and impact assessment





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a process for coastal resource management and impact assessment

prepared for:

Louisiana State Planning Office
Mr. Patrick W. Ryan, Executive Director

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contents

introduction to environmental management

All elements of the environment, including man, interact constantly. Man is unique in his ability to perceive this interaction and to participate in it consciously. His highly developed thought processes allow him to form a picture of the world as he sees it and a vision of how it might be if he could order the world himself. These world views are supported by memories, good and bad, of how things were in the past. Past, present, and future in this way help man to interpret his role in relation to his environment; that is, relative to his fellow man and the rest of nature. Man acts in accordance with these world views and the attitudes which he has developed around them.

It is sometimes forgotten that the relationship between man and the rest of the environment is reciprocal. Man is shaped by the dynamic interplay of natural elements and human culture. He is both nourished and threatened by the environment. He, like all other creatures, must adapt to the ever-changing conditions of his environment. Food supplies fluctuate. Predators and pests threaten human health. Social and political values are changing more rapidly than ever as media and transportation systems expand over the globe. Alvin Toffler illustrates the growing stress on mental health, attitudes, and human behavior such changes can effect in his book **Future Shock.**

The need for environmental management grows from a need to accommodate forces of change in human experience. People plan in order to gain some degree of security within a changing world. While man can control some changes, others he cannot. For example, by building, he can alter his environment. By conserving and preserving things which he values, he can seek to plan for forces of change. On the other hand, man is powerless against changes resulting from hurricanes which cross the coastal zone, although he can anticipate and lessen the adverse effects by evacuation. Management is a conscious effort to understand, direct, and prepare for changes in the environment. As such, some form of management is essential for survival.

In the broad sense, then, the goal of coastal zone management is to maintain or improve the quality of life. Quality of life includes economic stability, public health, social values, and also beauty—in Thomas Jefferson's words it is ". . . life, liberty, and the pursuit of happiness." Management decisions are made each day which ultimately enhance or detract from the quality of life in each parish. People do not intentionally lower the quality of life in their parish. Loss of valuable natural and cultural features is usually an unanticipated by-product of activities leading to the accomplishment of other perceived needs. One function of environment management, then, is to point out existing and potential conflicts between activities and to attempt to resolve them.

Since management is so deeply wedded to the quality of life and human aspirations, it must be the product of the people of the area. Management loses its meaning and effectiveness when totally programmed from outside the area affected. The people from each parish must identify the ends they seek, the things they value, and the intrinsic capabilities of that parish. They must also realize their relationship to surrounding areas such as the Continental Shelf, and to other levels of management. The parish has an important role in planning for Outer Continental Shelf activity and the changes it will produce within the parish

audience

This report is directed toward a broad audience. It is presented as a management handbook for elected and appointed officials, citizens, and private sector interests which may not be professionally involved in planning. It is also directed to professional planners at the state, regional, and local levels as a way of approaching some unique planning problems of the Louisiana coastal zone. The utility of the report to many groups lies in its presentation of a planning and impact assessment program which can be interpreted and adapted for specific application at the parish level. It is hoped that this report may lead to management programs that are responsive to critical social and environmental criteria.

objectives

The objectives of the report are to:
1) Present a background for understanding resource management
2) Present an overview of naturally occurring and manmade physical conditions that may be encountered in the Louisiana coastal area
3) Present a practical procedure for developing a local coastal resource management program
4) Present a systematic approach to resource management
5) Present an approach to assessment of onshore impacts resulting from Outer Continental Shelf (OCS) energy-related resource development.

coastal resources and parish government

People live in proximity to the things they value most. Cultural and family ties, jobs, and landscape features—these are the parish resources. Resources support all activities and provide hope for the future quality of life. They determine the unique potential and limitations of each place. For this reason, parish resources may be considered as a savings account. Resources may be invested and managed for long-term productivity as well as spent for immediate needs. The wise investment of resources is essential to the social, physical, and economic future of the parish.

Concern with environmental quality is critical at the parish level. The people who depend upon **renewable resources,** such as farmers, fishermen, and foresters, are directly affected by changes in the environment. Renewable resources have long-term value if properly managed. Parish economy is also based upon **non-renewable resources,** such as oil and gas, salt, and other minerals, which are depleted over a period of years. Non-renewable resources have a relatively short-term value while they are being extracted. Their value is increased, however, if they are used wisely and if the short-term revenues are reinvested in other sectors of the economy. Much of the business activity in coastal Louisiana revolves around the utilization of renewable and non-renewable resources. Those involved in industry, commerce, services, and development thus depend indirectly upon the land for economic support.

In addition, all residents are dependent upon the quality of the air they breathe and the water they drink. Air, rainfall, soils, wildlife, and vegetation all interact to support the residents of the parish. These basic **physical resources,** in combination with **human resources**—labor, technology, education, and culture—are implicit in the word **environment.**

Although the region and state are affected also by the conditions in each parish, immediate rewards or hardships are placed on the parish residents themselves. In cases of poor environmental management, the residents must bear the costs of pollution, loss of wildlife, loss of prime agricultural land, higher taxes to remedy adverse impacts, the degradation of local traditions and other social qualities that are often difficult to quantify. Maintenance of the resource base from generation to generation is an awesome responsibility.

management responsibilities

Coastal zone management and environmental impact assessment are responsibilities of considerable concern to public decision-makers in the coastal zone. Elected officials and professional staff deal on a day-to-day basis with the general needs of citizens and specific requests of interest groups. With increasing and sometimes conflicting pressures for use of the coastal area by manufacturing, trade, residential, transportation, resource production and extraction, utilities, recreation, and conservation interests, there is an accompanying need for management policies which guide the use of parish land and water resources.

Government—local, regional, state, and federal—oversees and attempts to resolve the problems which surround the use of natural and cultural resources. Each level of government must make a coordinated effort to insure a balance between social, economic, and environmental concerns. This task requires an understanding of coastal conditions, potential impacts which may disrupt them, and insight into the goals and needs of the inhabitants.

It would be misleading to lay all responsibility for environmental management on government institutions. Such an attitude often stems from an unwillingness to accept the responsibilities and challenges of one's own place on the land. Moreover, it is often inefficient. Large numbers of individuals, groups, and organizations make decisions which result directly in both positive and negative impacts upon parish resources. These parties must take responsibility for their respective actions and needs. Management policies relate best to the people involved when they are initiated by those people.

management concepts

Environmental management requires an understanding of social and natural processes. Action, based on ideas, or **concepts,** about the environment can lead to changes in physical features. These concepts are the theoretical base for planning, design, impact assessment, and in fact, all environmental experience. The three concepts presented below are an essential prerequisite to well-informed decision making.

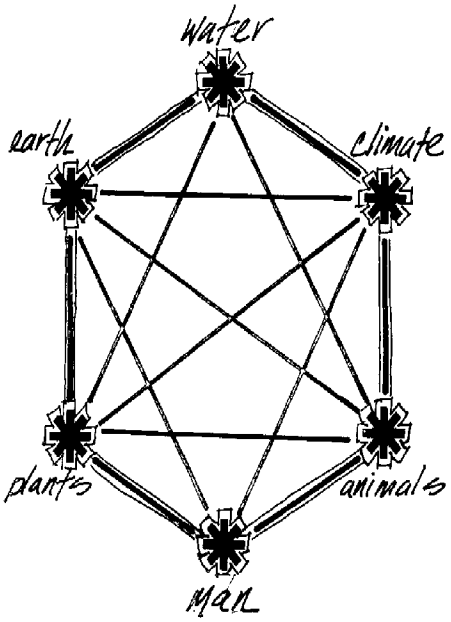
ecosystems

The ecosystem concept is a recognition that each part of the environment interacts to contribute to the working of the system as a whole. A change in one feature of the enviroment can produce changes in many other features which, in turn, alter still other parts of the environment. Thus, the web of environmental impacts can expand tremendously as a result of a single action. The entire system is directly affected by a change in any one of its parts. Similarly, an impact is not generally the result of one lone cause, but of many combined changes. This fact makes the mitigation of impacts an especially difficult task.

On the larger scale, no ecosystem can be considered as an entity unto itself. Just as each town is a member of a parish and each parish a member of the state political system, a marsh ecosystem is a part of an interdistributary basin which is a part of the delta ecosystem. The level chosen for management purposes depends upon the **scale** of the consideration. On a national scale, the Louisiana coastal zone may be considered as one ecosystem. At smaller scales, smaller ecosystems become more relevant.

In terms of management, the ecosystem concept has several implications. First, management must be conducted on a comprehensive level. The interconnection of geographical areas and interrelationship of political levels must be recognized. This is not to imply that specific project plans, geographical units, or political entities are not important to management decisions, only that they must be placed within the context of the whole.

Comprehensive and project planning are both a part of environmental management consideration. Comprehensive planning is used to study overall interrelationships of all types of land use, circulation, natural systems, and project impacts. It is the envelope into which project plans should fit. Project planning considers parts of the environment. It is used for specific proposals, including canals, levees, and housing developments. Project planning is most beneficial when it fits into the framework of comprehensive planning.



change and conflict

Throughout history man has witnessed the constant fluctuation and changes in the world. Two types of change actively operate in the environment. Seasons, lifespans, and weather all cycle in fairly regular patterns. Natural and cultural processes appear to constantly repeat themselves in days, years and ages. History, on the other hand, is linear; that is, proceeding in one direction. Unique situations and events occur in history which change the face of the earth. They are never repeated. Change, in both senses of the word, can sometimes be accelerated or slowed down by the conscious activity of man. Every action produces changes in the human condition as well as the environment. An effort to provide for needs such as food, clothing, shelter, and cultural goals may result in the loss of environmental resources, disruption of natural processes, and historical change. These losses can generate conflict between groups with opposing interests. To ignore the costs of change is blind and destructive. Sometimes, to avoid change and development can be just as destructive, life-denying, and stagnant. It is therefore important to establish a systematic process for making decisions and resolving conflicts.

point of view

Decisions are made by people—people in a unique situation at a unique time. Consequently, there are two factors which are involved in any judgment. The **subjective** factor is based upon human values, perception, and interests. Each culture and community has its own goals which must be recognized in the decision-making process. Attempts to arbitrarily impose values from the outside are doomed to failure. The subjective factor is complemented by **objective,** or scientific, information.

Objective data is independent of cultural values and input. This includes the measured data of environmental forms, processes, and materials, and the technologies available for environmental design and engineering. Physical opportunities and constraints upon man's use of the environment may be determined by this quantitative information. All decisions should be based upon a thorough consideration of both subjective values, objective information, and any conflicts which may exist between the two areas.

report organization

The logic and concepts of environmental management have been presented as a basis for outlining a process of parish-level planning and impact assessment of future OCS development.

The following sections of the report introduce the coastal zone of Louisiana, illustrate a model planning process, and simulate an impact assessment of OCS-related activity.

the coastal setting

The Louisiana coastal zone is presented in a general manner to introduce the types of features and processes that may be encountered in this rather unique setting. It is discussed in terms of geologic formation, biologic richness, and cultural use to give the reader a sense of the overall forces acting in the coastal area.

the process of environmental management

The major portion of this report deals with the essential **programs** and **processes** of environmental management. The section "Becoming Operational" presents an outline for organizing a Coastal Resource Management program. It focuses on the basic components and scheduling of parish actions to establish a program.

The sections which follow provide an illustrated example of the key operations in resources planning, such as collecting data and defining goals. They also point out ways to streamline the management process by strengthening the relationships between various programs.

reviewing proposals and assessing impacts

While the report is specifically concerned with the assessment of on-shore impacts from offshore development, the basic framework for making decisions and evaluating impacts is common to all development proposals. Although offshore development may introduce some specialized impacts, such as those resulting from pipelines, other impacts arise from general developments, such as housing, industry, and drainage canals supporting the offshore activities. Essentially, the report outlines a management and planning approach with OCS-related activity as an appropriate example for assessment.

the geographic model

This report takes an illustrative approach to the planning process described above using a simulated model of the coastal area developed for this report. The model represents an abstract composite of coastal features in Louisiana.

A model, as opposed to the actual coastal area, was used because it is the intent of this report to present an approach to management and assessment that is applicable to all of the parishes in the coastal area. The variety and location of physical and cultural features that were included in the model reflect the patterns which typically occur in Louisiana.

The parish used as an example is labeled "coastal parish." While the example focuses on "coastal parish," it will be obvious that the surrounding parishes influence the example in many ways. This is characteristic of parish planning in the coastal zone. Parish boundaries do not always follow natural boundaries, and, as a result, environmental management is a shared responsibility.

Each of the steps in the process is introduced and discussed. With the model as a base map, typical coastal parameters are inventoried and evaluated, management units are defined, goals for management units are developed, and techniques for implementing goals are outlined. The process is continued using the model in a methodology for evaluating impacts caused by the development of an offshore energy facility. Taken together, the phases of this report illustrate a sound approach for making decisions within Louisiana parishes.

the coastal setting

The Louisiana coastal zone is a geographic feature unique in the world. As Egypt was said to be a gift of the Nile River, Louisiana may be thought of as a gift of the Mississippi River. The Mississippi River drains nearly three-quarters of the continental United States. Soil carried by the river has been deposited over many thousands of years to form what we now know as coastal Louisiana. All natural features in Louisiana relate in some fashion to the materials and processes associated with the emptying of the Mississippi into the Gulf of Mexico.

The Gulf is a second major force making the Louisiana coastal zone what it is today. Winds, tides, and currents shape the land, deposit or rework sediments, and influence the climate of the coast. Storms originating in the Gulf besiege man and land. Gulf resources, such as fish and petroleum, support great numbers of people in Louisiana and the rest of the country.

The interactions of these two water systems have made Louisiana an important center of domestic and world trade. The opportunities of the region have induced many peoples—Indians, French, Spanish, Germans, Anglo-Saxons—to settle in the coastal areas. The fertile soils deposited by the river encouraged agriculture; the broad marshes and access to the Gulf encouraged fishing and trapping; petroleum resources, abundant freshwater supplies, and deepwater ports encouraged industrial growth. Coastal Louisiana may be considered one of the most important resource reserves in the United States.

the physical setting

"I saw in Louisiana a live oak growing
all alone it stood and the moss hung down
from the branches."
Walt Whitman

While rich in resources, the Louisiana coastal zone is an extremely fragile physical system. The interrelationships between earth, water, vegetation, and wildlife are sensitive to the slightest modification. This sensitivity may be understood within the context of major building and erosive processes which have shaped the coast through time. The formation of Louisiana's coast over the past 10,000 years is a process involving the deposition of soil from regular flooding, the establishment of vegetation, and the gradual buildup of organic or mineral deposits. Proper functioning of these processes insures the development of stable ridge areas, resource-laden swamps and marshes, and a protecting coastline. When any phase of coastal processes is hampered, other phases cannot function at their highest efficiency and the coastline begins to deteriorate. The processes which form the land are then not able to keep up with those working against it. Large areas of land subside below water level, valuable marshes are lost, and the coastline rapidly erodes because of marine tides and currents.

Each component of the coastal zone contributes to the quality and character of the environment. The natural levee ridge areas, with their relatively higher elevations and firm soils, provide the spines of land along which settlement and agriculture can occur with minimum environmental modification. They are a solid base from which man is able to utilize the resources of the coastal zone. The distributary channels provide water access and, historically, were major routes of transportation. The fringing swamp and marsh basins provide some protection to the ridge areas from coastal storms.

The estuary is the zone where saline and fresh waters meet. These estuarine areas are principal breeding grounds for many important fish and shellfish. The estuaries are also valuable for their ability to absorb natural wastes and supply an extensive food web. Like the rest of the delta zone, the marshes depend upon continuous land building and a balance of fresh and salt water. Changes in elevation or salinity drastically alter the vegetation and wildlife of an area.

The outermost zone of concern is the shoreline itself. Barrier islands, cheniers, and oyster reefs are extremely important aspects of the coastal area. These features buffer inland areas from eroding tides, winds, and dangerous storms. They protect man and estuarine wildlife alike. Barrier islands are built up by the deposition of sand and delta sediment by Gulf currents. The currents move the sediment along the coast, forming long chains of islands. If this process is impaired, the barrier simply erodes away; the coastline is left vulnerable and is likely to deteriorate.

Coastal deterioration is a natural phenomenon. As the river changes course, the old delta ceases to build and begins to be eroded. Land formation takes place in a new area. Human activities, however, can seriously accelerate coastal deterioration to the extent that far more land is lost than gained.

the cultural setting

Rich resources and an important water transportation network have made Louisiana a desirable place to live. Long before European settlement, Indian populations thrived here. Because of the unique physical features of the coastal zone, man has been forced to adapt certain aspects of his lifestyle to the structure of the land. To some extent, he also has had to modify the land in order to live here. In early times, this entailed clearing and draining land and building levees. While early settlers may not have understood the ecological significance of the swamps and marshes, they knew them as valuable sources of fish, game, and timber. The people of Louisiana developed distinctive cultural patterns based in part on their heritage from other parts of the world and in part on their relationship to the new environment.

Modern times marked rapid changes in the land and people. In addition to earlier interests in agriculture and wildlife, modern man developed the need for large quantities of subsurface materials, such as ground water, petroleum, gas, and salt. He began to use the coastal area for its industrial and manufacturing potential. Farming has been greatly industrialized, requiring less land and fewer people. As a result, many people have shifted from agriculture to other means of livelihood. Modern development necessitated extensive modification of the landscape, including the building of large urban areas, large-scale extraction of water, and construction of sewage disposal plants, pipelines, navigation canals, and port facilities. Earlier physical constraints on development have had to be solved in order to provide for the increased population. Coastal urban areas are changing so rapidly that much of their original character is being forfeited to the needs and lifestyles of modern urban America.

Suburban and rural areas face similar conditions. In addition to dwindling opportunities for small-scale economic activity and the social impacts of sprawling urbanization, modification of the landscape to meet the needs of modern agribusiness has changed the patterns of rural living. Modification of the environment to accommodate expanding suburbs has increased the potential for flooding, subsidence, and saltwater intrusion into valuable drinking supplies. These changes have brought unexpected environmental side effects which do not always work to the advantage of human population.

The cultural heritage and potential of Louisiana is as rich as its physical resources—it is also as vulnerable. The relationship between man and land which began in prehistoric times is even more important today with our expanded population and needs. History reveals that some uses of the land are incompatible with others or with the environmental setting. This does not necessarily mean that the needs and objectives of those uses are incompatible, but that wise decisions are required to make them a productive and compatible part of the environment. Some changes are irreversible. Planning can help people to realize the physical and cultural choices they have and the way in which they will be affected by those choices. We are obliged to try to make the choices which will insure the continuation and creative development of our culture in harmony with the environment.

the process of management

Environmental management is a process for arriving at decisions which have a strong rationale. This process is based on the premise that decisions should reflect well-defined objective and subjective information rather than simply intuition or expediency. The process of management suggested by this report has five major steps, presented in logical order. In actual practice, the various steps may be pursued simultaneously and modified as information becomes available. The steps of the environmental management process are as follows:

a. Become Operational. A coastal resource management program is initiated with the decision to systematically insure the rational use of parish resources. The initial concern after this decision has been made is for the organization and scheduling of the program. The three essential components of coastal resource management are staff, programs, and funding. The programs which are selected will determine the nature and extent of the necessary staff and funds. After these ingredients are defined a timetable for the program may be established. The timetable simply illustrates the step-by-step approach to getting the program started. When the organization and schedule of the agency are established, it is possible to pursue the management program below.

b. Collect and interpret data. The collection, analysis, and interpretation of data is essential for logical decision making. Predicting and directing change require a broad understanding of existing processes, forms, and materials in the environment. This includes a wide variety of natural and cultural factors, or **parameters.** Geology, hydrology, land use, and archeology are among the parameters to be inventoried. Environmental inventory is a continuing process of collection, research, and updating information for use in other steps.

The individual pieces of the inventory are difficult to use by themselves in a decision-making process. When variations of the parameters are grouped into the associations in which they occur naturally, such as natural levees, interdistributary basins, and barrier complexes, the interrelationships between different processes may be easily seen. When this process of **grouping parameters** is accomplished, management units may be defined and goals set.

The **management unit concept** is basic to practical parish planning and impact assessment. A management unit is an area of land with internally consistent physical and cultural conditions. Examples of management units could include a heavily urbanized levee or a large wetland basin. The delineation of management units is based upon the environmental inventory and parameter grouping steps discussed above. Once defined, the management unit becomes a reference point for future inventory, evaluation, goal setting, physical planning, and assessment of impacts. It becomes a clearly delineated vehicle for judging environmental needs and implementing policies.

c. Define goals. Planning decisions are not evolved simply from concrete physical data. If management is to be supported by the people, it must clearly reflect their values, needs, and desires. Specific goals for each management unit should incorporate objective information and subjective values based upon ecological trends, development opportunities, physical constraints, laws, and social interests. Goals are complex, difficult to define, and can change as a result of internal or external pressures. In addition, the perceived objectives of one group may not be the same as those of other groups. Nevertheless, the process of collectively stating goals is an important component in sound decision-making and effective implementation practices. The consideration of goals is also an open opportunity for the public to participate in the planning process.

d. Implement goals. Decision makers have a broad range of options which may be used to carry out, or implement, management unit goals. If goal development can be seen as "what" needs to be done, implementation can be seen as "how" the goal is to be achieved. The means for implementing goals range from simple suggestions, to permits and regulations, to full public acquisition of land. The choice of policy depends upon the purpose of the goal, the funds available, the priority of the goal, and the administrative ability to carry it out.

e. Assess impacts and review proposals. Management is not a one-time event, but a continual process. Since changes in both environmental conditions and social needs are likely to occur, there is a need for constant monitoring of these factors. Plans and implementation practices must be revised accordingly. Impact assessment represents an attempt to forecast the changes which will result from a proposed action. This includes recording and measuring, insofar as possible, the benefits and costs of the action. An assessment makes it possible to avoid or lessen adverse impacts, optimize benefits, and pursue alternatives. In this way, it allows for a consistent, systematic way of dealing with change.

becoming operational

There are three important phases to becoming operational.

1. Initially, there must be a **recognized need** for resource management. The parish economy and quality of life depend heavily upon its resource base. Recognizing the need to protect this resource base is the first step toward starting a management program. Often this will require a public forum to more accurately describe the needs and goals of the parish. The chances for establishing a strong program are increased by the open involvement of a broad base of interested people. The final outcome of this first phase should include a statement of intent and the establishment of a task force or committee to expand upon this statement.

2. The second phase of developing a program involves a detailed description of the proposed program itself. The task force must address itself to the following question, "What steps are necessary to achieve the goals mentioned in the initial statement?" There are five essential considerations which must be specifically defined if coastal resource management is to become a reality.

a. Programs and Responsibilities.
1) Collecting and Interpreting Data
2) Defining Goals
3) Implementing Goals
4) Impact Assessment and Evaluation
(These are discussed more fully in the sections which follow.)

b. Institutional Organization. It will be important to establish the place of the coastal resources management program within the existing parish government organization. Key issues will include:
1) Is the program under an existing agency or does it function as a separate agency?
2) Who supervises the agency actions?
3) What is the role of the program in the formulation of policy? The scope, powers, and objectives of the agency must be clearly stated. Complicated procedures, piecemeal authority, and vague responsibilities are unproductive.

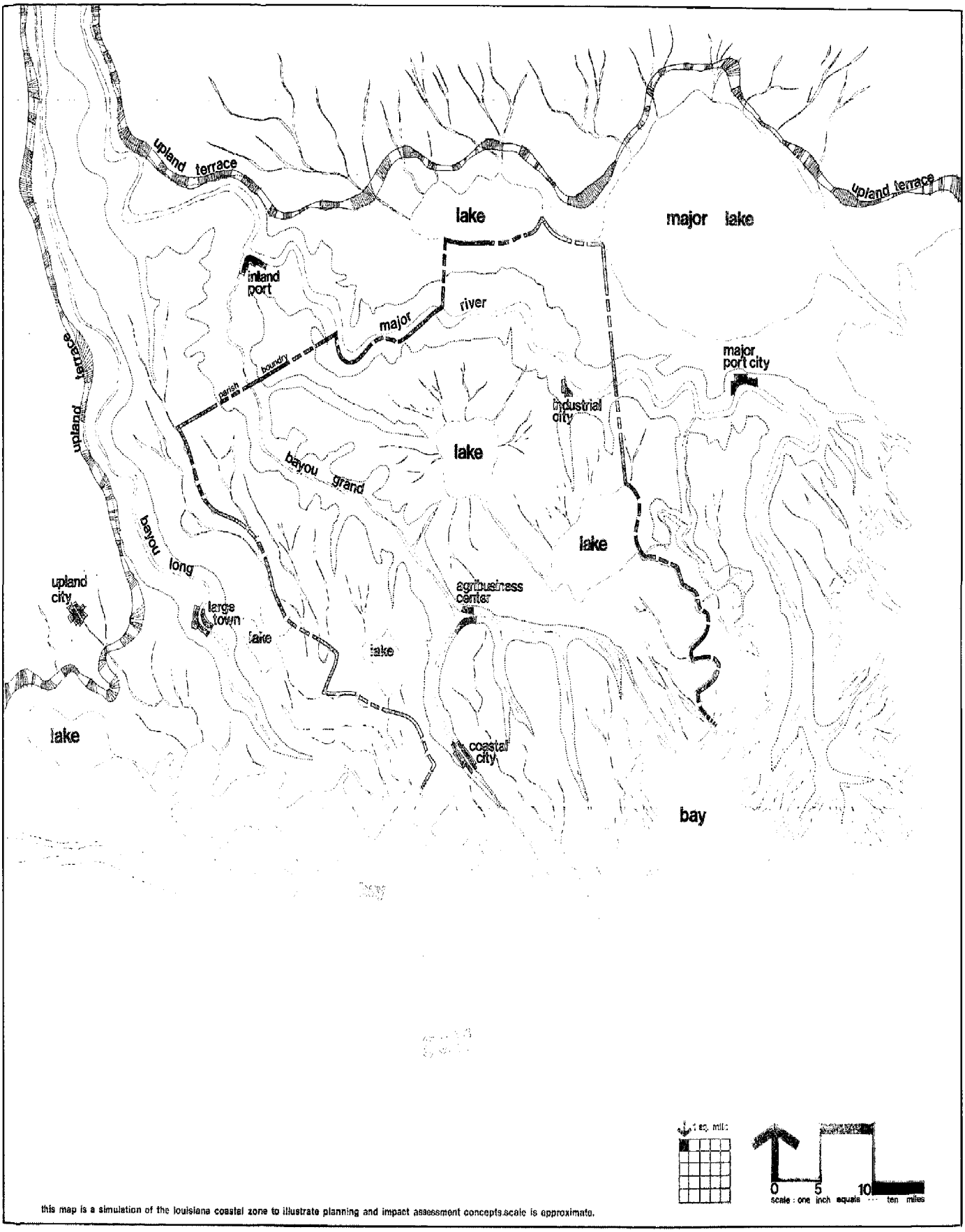
c. Staff. While an in-house team can outline the basic structure of the program, an effective resource management program requires a permanent staff dealing specifically with the problems of the coastal area. The task force (or in-house planning team) will want to describe in detail the staff requirements for its new program. General guidelines are presented below:
1) **Management personnel** should have a broad background in the environmental sciences, planning practices, economics, and public affairs.
2) **Research personnel** at the parish level are primarily involved with data collection, interpretation, and new directions in the parish management program.
3) **Support personnel** include drafting, secretarial, editing, and public relations staff.

d. Funding. The current importance of coastal resource management has generated considerable funds from federal and state sources. In response to specific needs, local governments are setting aside funds for the development of strong coastal zone management programs. The level of funding directly determines the size of the permanent staff, the scope of concerns, and the depth of programs. It should also be recognized that an ambitious program will draw grants from government and private sources. The parish, after developing a list of specific needs, should determine the levels of permanent funding and grant support available to establish its program.

e. Final Proposals. The task force will have to manipulate its programs, staff, and funding sources in order to come up with a comprehensive package and alternatives to present to the public and governing bodies.

3. The final phase in establishing a resource management program lies in **public review, administrative approval,** and the **actual start of operations.** The people of the parish should be informed, if not involved, throughout the process. Government approval at the local level depends largely upon the level of this involvement. Approval for funds at the state and federal level, on the other hand, will depend upon the final structure of the program. After approval is received, the parish must actively seek grants, establish permanent funding, hire staff, and begin programs. This step-by-step procedure, spanning eighteen (18) months, can lead to a well-thought-out and highly efficient parish program.

month	program schedule
0	**establishing a recognized need**
	1) Government commitment to action
	2) Public information program
3	**program definition (by Task Force)**
	1) Determine institutional organization of CZM agencies
	2) Define responsibilities and programs of agency
	3) Determine staff needs
	4) Determine funding requirements, sources, and availability
6	5) Adjust the above into an agency and program proposal
	6) Present Findings
9	**approval and start up**
	1) Government approval and program adjustments
12	2) Public participation program
	3) Acquire funding
	4) Hire staff
18	5) Initiate programs



this map is a simulation of the louisiana coastal zone to illustrate planning and impact assessment concepts.scale is approximate.

collecting and interpreting data

To make decisions which will have long-term benefits, the people of a parish such as "coastal parish" must first have a working knowledge of the major natural and cultural features of their environment and the legal issues which apply. Consequently, initial concern lies in developing a data base and uniform framework for management practices. Three steps are involved in the collection and interpretation of data:
1) Compiling an environmental inventory
2) Grouping parameters
3) Defining management units.
These steps will be discussed in the following sections and are illustrated on maps.

compiling an environmental inventory

Inventory is a continuous process of collecting information which reveals the condition of the environment. The initial inventory is referred to as an environmental baseline. Information collected later monitors the physical trends which take place in the parish. The environmental baseline is developed by isolating features, or parameters, of the environment. These parameters may be inventoried, mapped, and analyzed as to the location, quantity, quality, and sensitivity of features to modification. They may also be evaluated for their resource value to man. This report briefly investigates the parameters listed below.

Natural Parameters
Hydrologic features
Hydrologic resources
Geologic features
Geologic resources
Botanical features
Botanical resources
Wildlife features
Wildlife resources
Climate

Cultural Parameters
Land use and economy
Cultural history
Circulation
Environmental Imagery

The enviromental baseline has several important functions: 1) to establish the location of important physical features in the environment, 2) to help establish cause-and-effect relationships among components, and 3) to relate actions and impacts by the study of changes over a period of time.

The baseline thus serves as a valuable tool for understanding and monitoring spatial and temporal patterns. By compiling and monitoring key parameters, the potentials and limitations of the environment for various uses may be established. An awareness of these intrinsic capabilities provides guidance for the development of goals, policies, and decisions.

The inventory of "coastal parish" which follows is geared toward fulfilling the functions outlined above.
1) Each parameter is mapped and analyzed to identify its important parts and processes.
2) The role of each parameter in the ecosystem is discussed.
3) Parameters are analyzed for their present resource value to man.
4) Potentials and limitations for use are discussed.
5) Potential adverse impacts are described.
6) Considerations for long-term productivity are listed.
7) Sources of information, including public agencies and essential texts, are listed.
As will become apparent later, these elements are the essential ingredients of environmental impact evaluation. By dealing with them at the start of the planning process, impact assessment is made more efficient and reliable.

mapping information

Maps are an essential component of environmental management. They communicate selected information about environmental conditions and processes. Physical and cultural features mapped over time are good indicators of important trends, such as land loss and saltwater intrusion, in the coastal zone.

Maps are compiled by means of surveys. Modern techniques of surveying have expanded to include satellite and aerial photography. The selected information is mapped at a scale which reflects the level of concern. **Scale** is a ratio between the actual size of features and the size shown on the map. Using standard scales has important benefits. Standard scales are an aid to comprehensive coastal planning. They increase the value of the map as a tool for communication. In addition, base maps are readily available at standard scales. This facilitates both parish and state mapping objectives. The following map scales are suggested for long-term inventory and planning efforts.

1:24,000	(1″=2000′)	— USGS 7½-Minute Quadrangle
1:62,500		— USGS 15-Minute Quadrangle
1:250,000		— USGS Topographic Maps and State Land Use Maps

Mapping and analysis should be carried out at the scales shown. For a more complete introduction to the application of maps to the planning process, see the Louisiana Planner's Mapping Guide by Schwerts and Larimore, 1975.

hydrologic features

hydrologic cycle

As water moves around and across the earth's surface, it is affected by a number of processes, including evaporation, precipitation, runoff, collection by streams and rivers, and distribution. Collectively, these and other processes form the hydrologic cycle—a cycle which moves water from land and sea into the atmosphere and back again. Hydrology is of great significance to the physical and cultural development of coastal Louisiana. Major water-related processes which shape the coast are outlined below.

delta building

Rivers passing through Louisiana make a transition from water collectors to water distributors. The Mississippi River is the most important of these distributors, followed by the Atchafalaya River. As sediment-laden waters reach the Gulf of Mexico, they slow down and deposit their sediment load. The delta which forms at the mouth of the river or in embayments builds outward and upward in the Gulf. The river, under natural conditions, shifts its course over many years to follow shorter and steeper courses to the coast.

periodic flooding

The rivers and bayous of coastal Louisiana in their natural state overflow periodically, usually in the spring. This discharge introduces sediment and freshwater into basins between the distributaries. Basins on the map are lettered **a** through **g.** In addition, to river flooding, runoff from rainfall may cause flooding within the basins. There is a gradual movement of water from north to south through the swamps and from fresh marshes to the intermediate and brackish (5 ppt) water marshes. The waters increase in salinity (15 ppt) as they near the Gulf. The fluctuating exchange between gulf and river waters causes variation in salinity, nutrient flow, acidity, temperature, and oxygen content of the water. These factors, in turn, define plant and animal habitats and determine the biological productivity of the coastal area.

marine processes

The waters of the Gulf of Mexico are an important determinant of estuarine conditions and the distribution of sediments. Sea waters carry juvenile marine organisms and sediments into the estuary. Sediments along the coast are moved by wave and current action. The sediments of abandoned deltas are gradually eroded and redeposited at other locations on the coast.

ground water

Besides the surface water activity, ground water availability and quality need to be considered. Developed areas require fresh water for most urban or industrial uses. Fresh ground water is generally lacking in the coastal area, however, particularly in the southern sections. The subsurface aquifers in the coastal zone are often brackish or have high mineral content. Consequently, most areas in the coastal zone must rely on surface waters for drinking, cooling, and irrigation.

sensitivity

The potential impact on hydrologic systems is dominated by two concerns: change in hydrologic processes and change in water quality. Hydrologic processes may be altered by dredging pipelines and navigation canals, diking, draining, and the construction of locks. Water quality may be altered by thermal, industrial, and agricultural pollution. Such modifications may change the supply or quality of fresh water in marsh areas, causing impacts on vegetation, wildlife, and man which may be severely felt.

Given the dependence of all other features of the ecosystem upon water, hydrology must be viewed as a prime determinant of management policy. While water has some capacity for the absorption and purification of wastes, trends show that this capacity is limited. In some cases, the damage done by inferior water quality or changes in freshwater supply is irreversible.

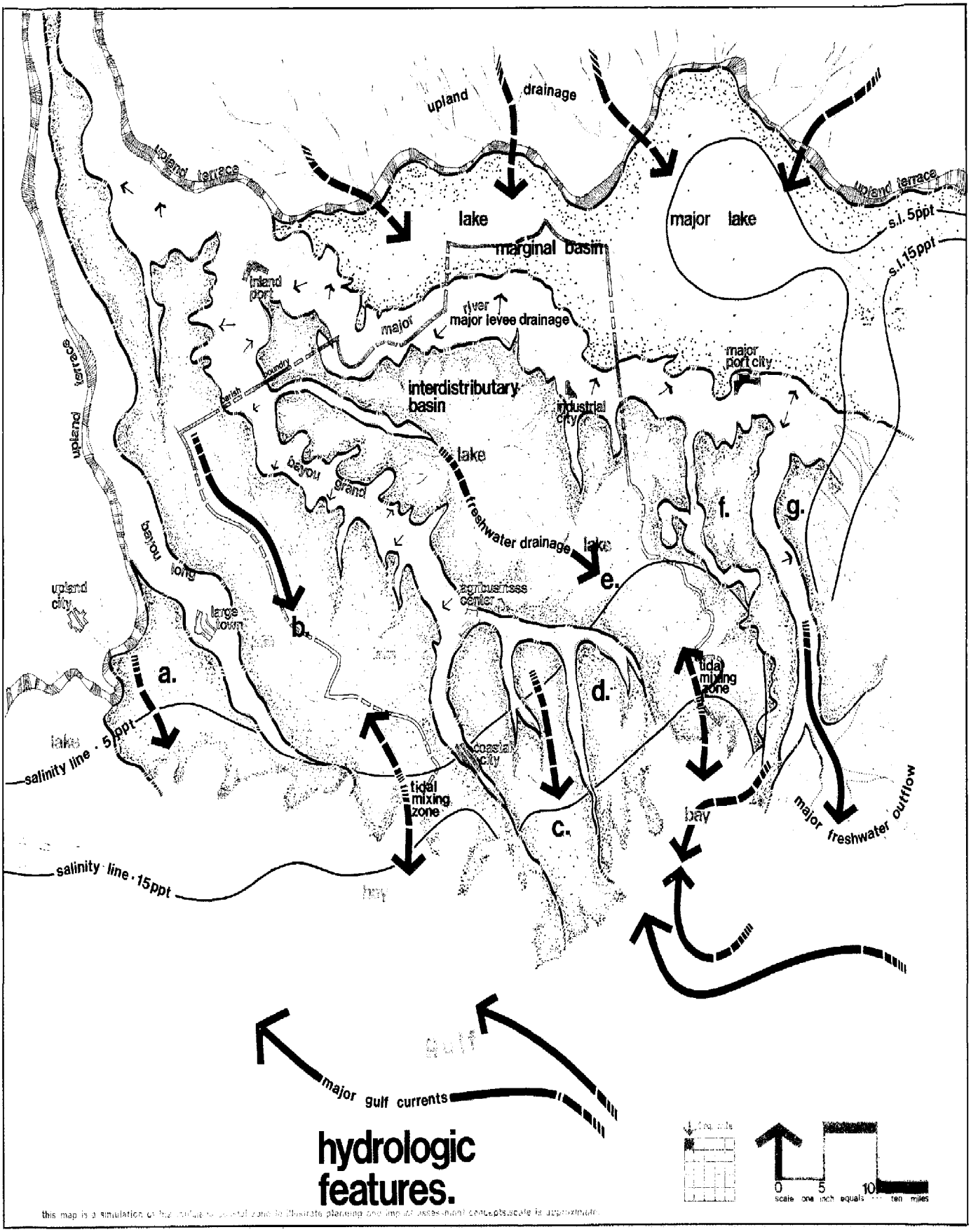
intrinsic suitability

The impacts described above indicate that there are levels of use which would apply to the different water bodies. Different types of water areas are capable of different types of modification.

People of the parish can identify those water bodies which can withstand different types and levels of activity as given below.

1) Low-level activity—areas of high sensitivity, such as drinking supplies, wildlife management areas, fisheries nursery areas.
2) Moderate-level activity—outdoor recreation, camps.
3) High-level activity—navigation, disposal of treated waste, and runoff from developed areas.

While some bodies of water can adjust to change, all of them have upper limits to that ability.



this map is a simulation of the nature of coastal zone hydrologic planning and impact assessment concepts.scale is approximate

hydrologic resources

ecological support

Water is properly recognized by all cultures as a source of life. In addition to its values for drinking, recreation, and other human uses, water is the basis for all plant and animal life. All organisms ultimately are dependent upon a stable and pure water supply. It is the major force for transport of sediments and nutrients and for dispersal of potential pollutants in the coastal area.

renewable resource value

Water should be viewed and managed as the most valuable renewable resource in the parish. Its resource values include uses for:

1) drinking water
2) industrial processes and cooling
3) agriculture
4) navigation and transportation
5) recreation
6) waste treatment and purification
7) wildlife and fisheries production.

The renewable, or reuseable, nature of water may be compromised when quality or quantities are altered. Such modifications may be brought about by saltwater intrusion, concentration of industrial or urban wastes, over heating, or over-use to the exhaustion of the available supplies.

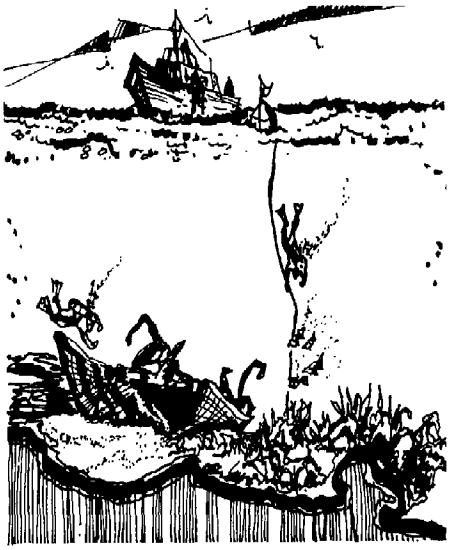
Much of the economic activity in coastal Louisiana is water-resource oriented. Shipping, fisheries, offshore transportation, and agriculture all make demands on the resource.

The demands and uses of water for these various purposes are not entirely compatible. A degradation of the supply by one industry may seriously affect uses by others. For example:

1) Industrial, agricultural, or urban runoff pollution can reduce the value of areas for recreation, fishing, or fur-trapping.
2) Dredging can introduce salt water into fresh supplies and upset marsh or swamp ecosystems.
3) Fill areas, borrow pits, and spoil banks can alter overland flow and water levels and reduce the amount of area receiving nutrients and sediments.

short-term use vs. long-term productivity

Short-term uses of water are related to the immediate needs of man primarily for tranportation and waste disposal. Long-term productivity of water rests primarily in the renewable resource uses of agriculture, drinking, fisheries, and recreation. There is not necessarily a conflict between the short-term use and long-term productivity, but there can be. Short-term uses that substantially affect water flow, water quantity, water quality, or foster the deposition of pollutants and sediments in the water column can effectively reduce renewable resources production.



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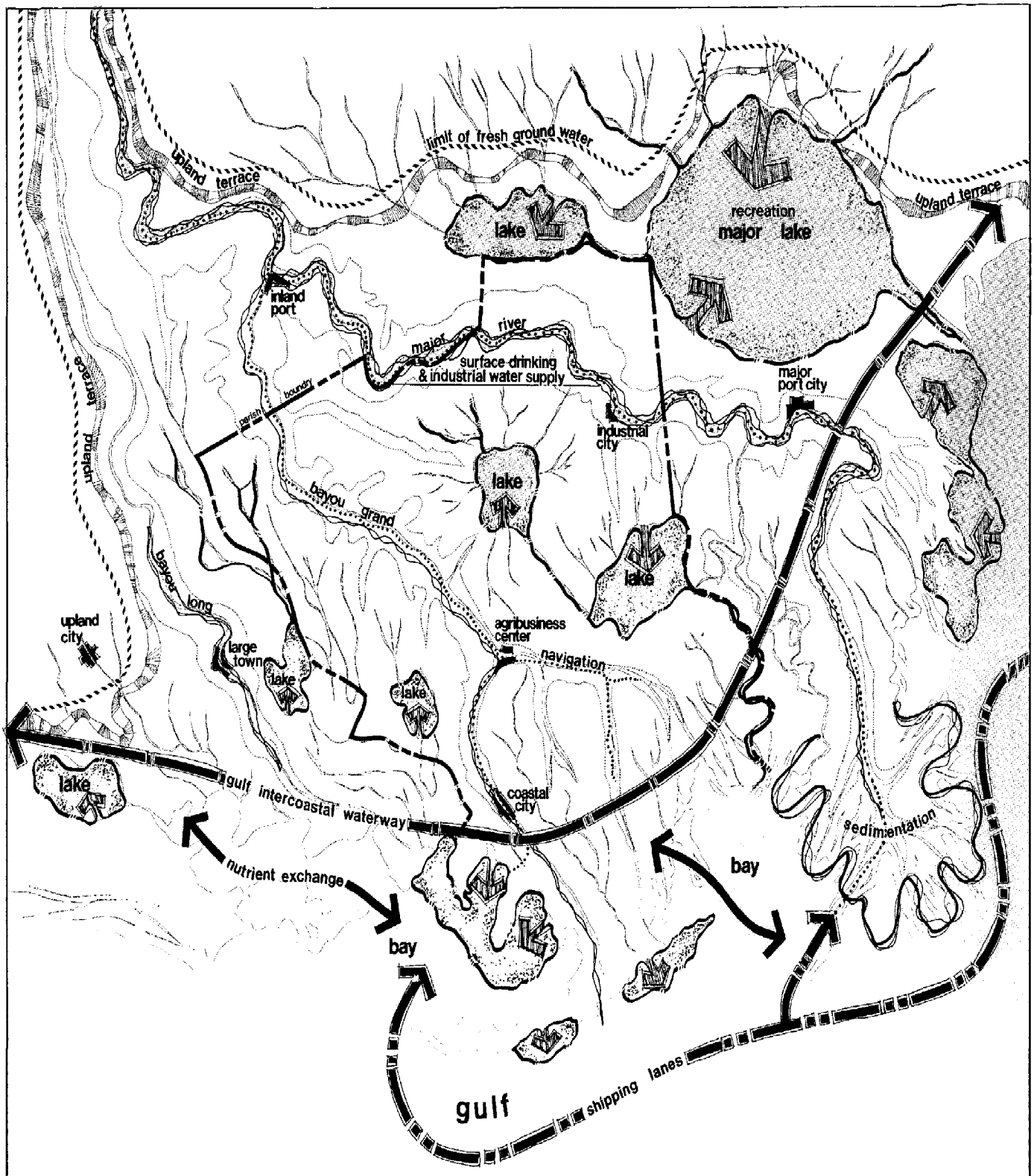


hydrologic resources.

1 sq. mile

0 5 10

scale : one inch equals ten miles

this map is a simulation of the louisiana coastal zone to illustrate planning and impact assessment concepts.scale is approximate.

geologic features

"Manifold events of sand
change the dune's shape that will not be the same shape tomorrow."
A. R. Ammons

geologic forms, processes, materials

The geologic and hydrologic processes in coastal Louisiana are closely interwoven.

The coastal zone, located between the upland terraces to the north and the continental shelf to the south, is greatly affected by the processes of deposition, subsidence, and erosion.

Sedimentary materials brought down river build out into the Gulf, there to be reworked by marine processes into barrier islands, beaches, and mudflats. Deposition of sediments from periodic flooding helps increase the elevation of natural levees and adds mineral materials to the large wetland basins. Vegetation aids in the accretion process by deposition of organic matter and entrapment of sediments.

Subsidence and erosion work to reduce land elevation and area. The entire coastal zone of Louisiana is subsiding because of its position on a dip in the earth's crust, compaction of offshore sediments, and faulting. Soft sedimentary and organic materials lying at or near sea level are easily eroded by marine forces.

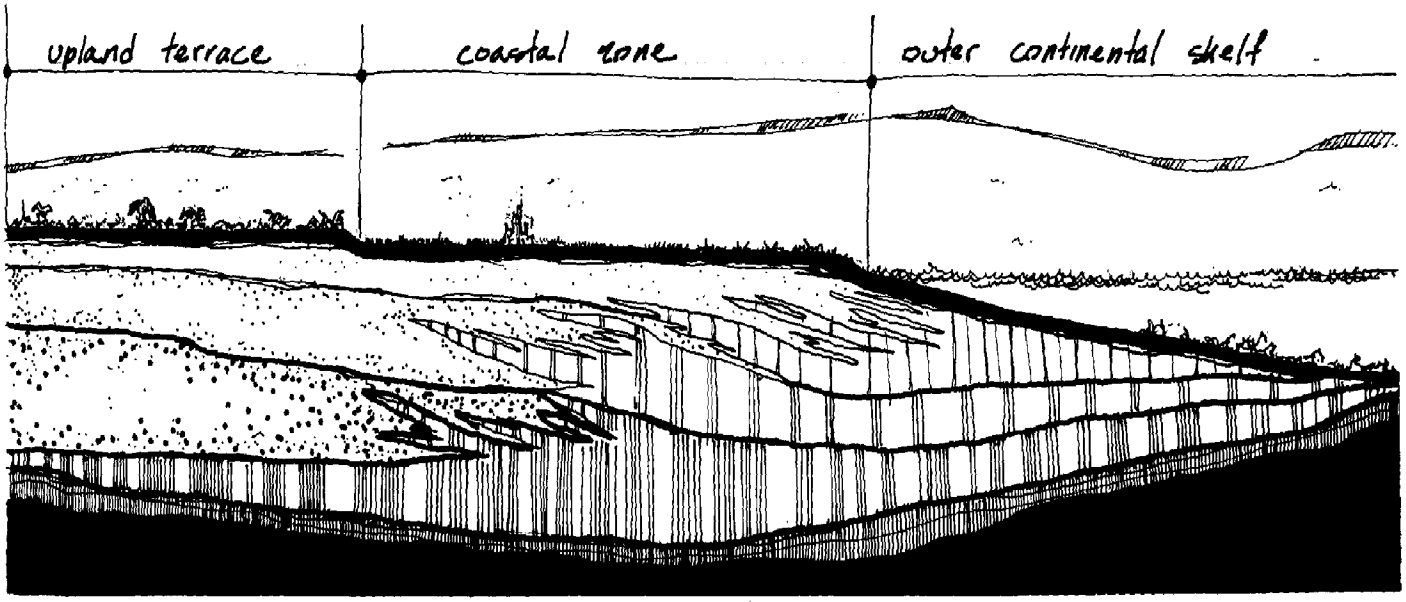
potential impacts

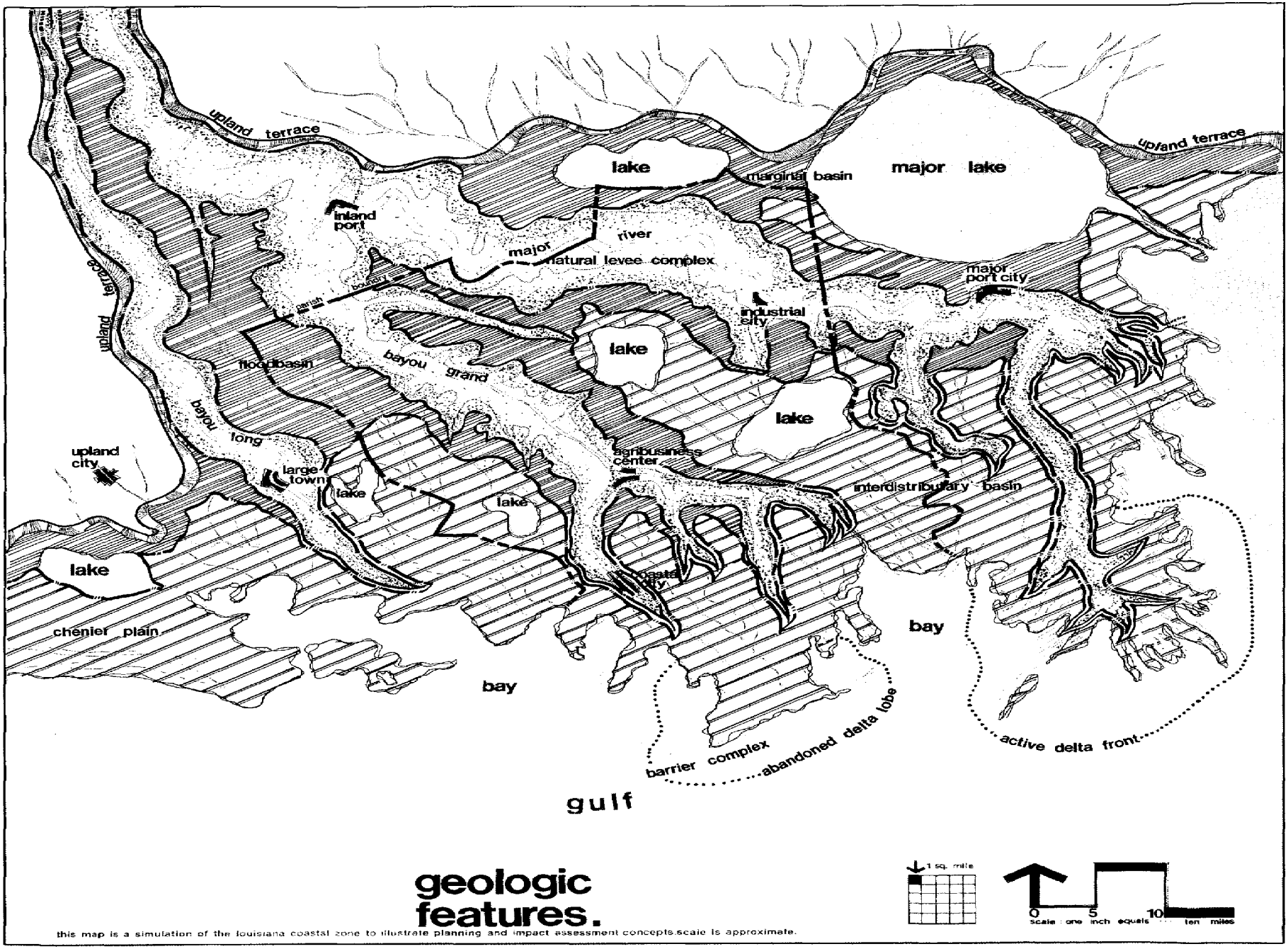
The interplay between processes of land building and deterioration is a delicate balance of the greatest significance to man. Rapid deterioration may be initiated by any of the following activities:

1) Prevention of deposition of new sediment from river waters by leveeing bayous, diking basins, and dredging channels.
2) Drainage of wetlands, resulting in aerobic decay of organic matter and compaction of wet mineral soils.
3) Clearing and burning of vegetation thus preventing build-up of organic matter.
4) Eliminating the deposition of sediments by marine currents through the disruption of littoral currents.
5) Damaging protective vegetation.
6) Cutting inland channels in marsh areas or through barrier islands.
7) Operation of wake-producing boats and wetland vehicles in marsh areas.

intrinsic suitability

The limitations and potentials placed upon human use of the environment from a geologic standpoint follow from the list above. Given geological constraints, we can designate three types of geologic areas and their potential to support activities:
1) Areas which can support heavy loads and high density uses.
2) Areas which can support some activity but not heavy loads.
3) Areas which cannot support any activity; eroding coastlines and rapidly subsiding areas.





geologic features.

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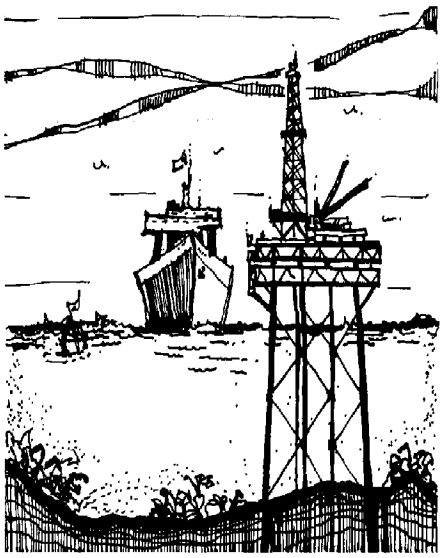
1 sq. mile

0 5 10

scale : one inch equals ten miles



geologic resources

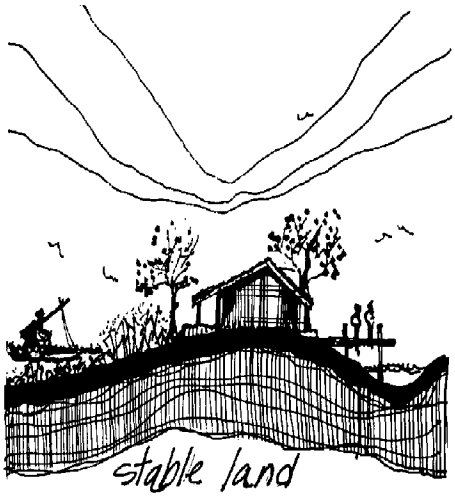
The land supports and nourishes all life, especially terrestrial species. In addition to the ancient values of food production for all animals and nutrients for plants, the geological base has provided mineral resources and a rich source of energy in the form of fossil fuels. The gulfward extension of the coastal land mass also offers a buffer against tropical storms and hurricanes originating in the Gulf.

renewable resources

The value of the land as a renewable resource base for man includes land-based recreation and the use of fertile soils for agriculture and forestry. If located in areas which can support their use and if managed properly, these activities are valuable for indefinite periods of time.

non-renewable resources

Non-renewable geologic resources in Louisiana are, for the most part, subsurface elements. Salt, sulphur, oil, and gas are prime material resources in the coastal parishes, nearshore waters and on the Outer Continental Shelf. In addition, man uses near-surface deposits of sand, gravel, shell, and clay.



relation to human resources

A large portion of the coastal population is directly involved in either the extraction of resources or agricultural production. Many others are involved in petro-chemical manufacturing, support industries, and agricultural processing. These activities can involve extensive modification of surface and subsurface features. As a result, much of the potential impact in coastal areas results from the use of the geologic resource base.

impacts from utilization

Four sources of impacts arise from the utilization of geological resources: 1) impacts from the extraction of resources, 2) impacts from production and processing activities, 3) impacts from the transportation of minerals, and 4) impacts from support activities. Impacts accrue to a wide range of geologically related elements, including vegetation, water, soils, and the economic value of real estate itself.

short-term use vs. long-term productivity

The trends of erosion and subsidence, accelerated by human modification, necessitate a protection program against geologic deterioration. The following concerns dominate the management of geologic resources.

1) Need to conserve the amount of land in relation to water by limiting erosion.
2) Need to permit (and initiate) new land building by such means as controlled overflow or diversion.
3) Need to maintain subsurface water table, thus minimizing subsidence.
4) Need to conserve soil quality by limiting erosion and nutrient loss on developed levee ridges.
5) Need to minimize extraction and production impacts and to reclaim impacted areas.
6) Need to locate land-based activities in areas where they can be geologically supported.
7) Need to maintain subsurface order of soils.

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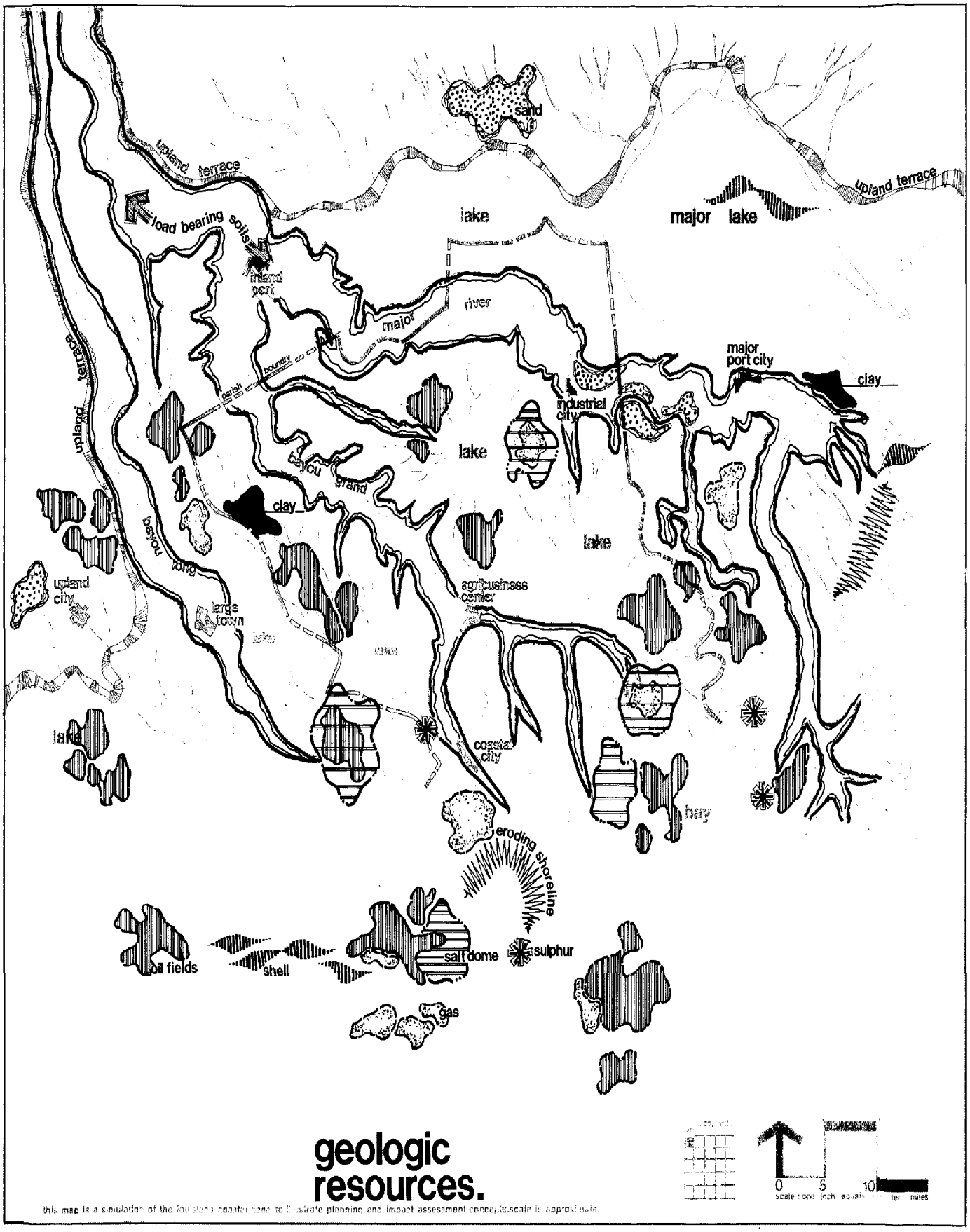


geologic resources.

this map is a simulation of the louisiana coastal zone to illustrate planning and impact assessment concepts.scale is approximate

botanical features

processes

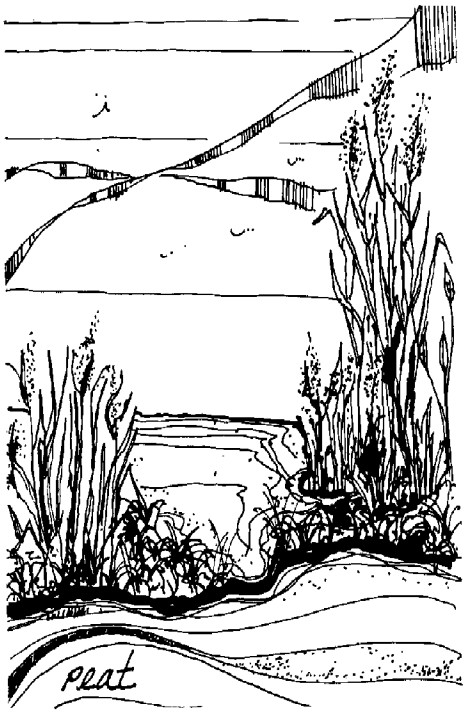
Vegetation plays an essential role in protecting, nourishing, building, and maintaining the coastal zone. The value of plants in soil building and supplying nutrients to the food web must be recognized. Several processes are involved in the establishment of coastal vegetation.

succession

Starting with bare ground, plant associations will establish themselves in sequential patterns until a fairly stable community is formed. The particular association of plants in the community will be in balance for a given set of soil, water, and climatic conditions. If conditions are changed, plant associations may be altered or killed and a new succession may start. For example, rapid sedimentation may destroy a cypress swamp and start a progression to bottomland hardwoods.

aggradation

As the coastline builds outward, plants begin to occupy areas built earlier. In the depressions between natural levees, plants aid in vertical land building by entrapment of sediments and by deposition of organic material. Accumulation of organic litter may keep pace with subsidence. Thick layers of peat soils in the coastal areas attest to the importance of this depositional process.



photosynthesis

Vegetation is at the base of the food web. Plants utilize solar energy to convert carbon dioxide and water into organic compounds in a process known as photosynthesis. This process is the foundation of all life on the planet and is a basic element in the cycling of oxygen and carbon in the biosphere. All animal life, including man, ultimately relies upon the plant world.

As a result of the ability of plants to draw energy for growth directly from the sun and their regular adaptation to only certain conditions, typical plant communities are formed. These communities are composed of certain recurring associations of plants. In the coastal zone, there is a natural progression of plants from the coast line to the uplands, from salt marsh to brackish and intermediate marsh, then to fresh marsh, swamps, and the oak/gum forests of higher ground. The types of plants growing at any one place are determined primarily by salinity, water levels, soils, and land elevation.

potential impact

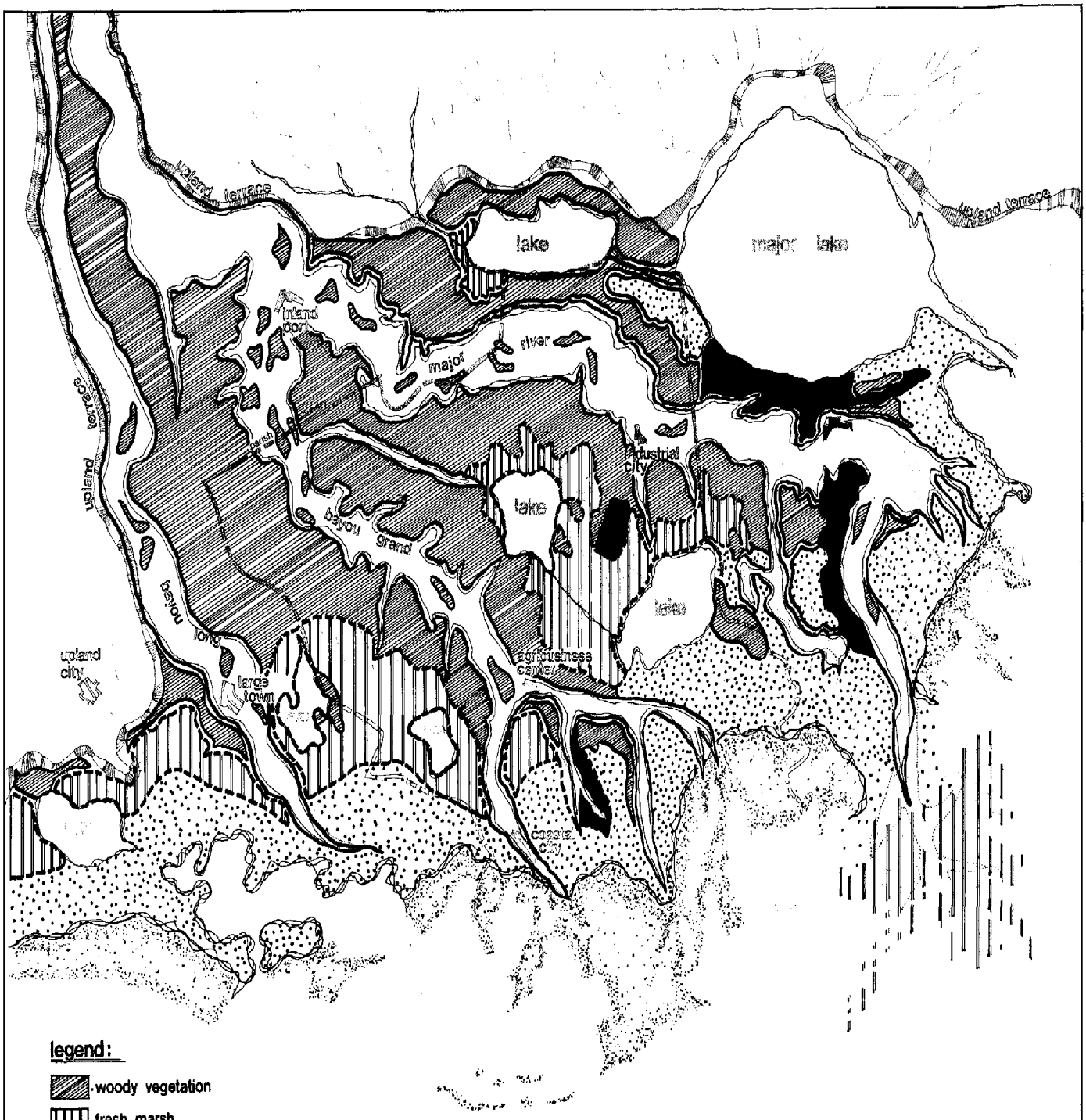
While vegetation has remarkable powers of regeneration and renewal, it is also extremely sensitive to environmental change. Change in vegetation is a highly visible indicator of the ecological trends and conditions in a particular area. Vegetation may be jeopardized by any of the following causes.

1) Changes in ecological conditions, such as salinity, temperature, water level, and drainage.
2) Changes in environmental quality caused by air, oil, and water pollution.
3) Modification of plant associations by clearing.
4) Direct physical damage by marsh vehicles, dredging, or filling.

intrinsic suitability

Some plants have a greater potential to adapt to change than others. Some modifications will result in new plant associations which may not reflect extensive damage to the environment as a whole. It is important to identify those areas which are particularly dependent upon native plant cover for the stability or productivity of the ecosystem. A classification scale may include, for example, such categories as:

1) Extremely vulnerable vegetation—marsh grasses.
2) Important habitat—wildlife conservation areas, marsh, swamp.
3) Special vegetation—historic or large specimens.
4) Areas which are somewhat tolerant of change—upland forests, natural levee forests.
5) Areas which are significantly modified—agriculture, drained swamp, and spoil bank vegetation.



botanical features.

this map is a simulation of the louisiana coastal zone to illustrate planning and impact assessment concepts. scale is approximate.

botanical resources

support value

Vegetation is the primary support for wildlife habitat. From the level of phytoplankton on up through grasses, shrubs, and trees, plants form a basic life-support structure. In addition, vegetation performs many climatological and practical functions which are seldom recognized. Aside from the ecological values mentioned above, plants control climate by absorbing heat, filtering the atmosphere, and directing air currents. This has special significance in Louisiana, where the need for ventilation, shade, and protection from tropical storms is paramount. By slowing down and diverting air and water currents, plants reduce soil erosion.

Vegetation also shapes and enriches environmental experience. Plants buffer noise, absorb glare, and frame spatial experience. They can be used to screen out poor views, create privacy, and enrich weak visual images.

renewable resources

The renewable resource base in Louisiana is related to agricultural production, fisheries (which are heavily dependent upon coastal marsh plants), and timber. Agriculture and fisheries are far more important than timber resources in the coastal area. Vegetation has scenic values as well. The lushness of Louisiana bayou country and its appeal to tourists is also dependent to a great degree upon the vegetation resources. The seasonal variation of growth, blooming, death, and regeneration has inspired men from prehistoric times to the present. This continuity is threatened by the uncontrolled destruction of plant communities.

Several potential hazards relate to utilization of vegetation resources. The renewable resource may become non-renewable or economically unfeasible to retrieve if overharvested or not managed. The cypress lumber industry in Louisiana is a good example of a renewable resource sacrificed to short-term gain at the turn of the century. Utilization of vegetation for one purpose may destroy its use for another. Dredging, draining, and filling of swamp areas for agriculture may reduce the potential of the swamp to support wildlife or to build new soil.

short-term use vs. long-term productivity

Several guidelines may be drawn from this discussion of vegetation resources. Productivity may be measured in terms of short-term economic gain for a single commodity or in terms of its long-term value for multiple use. The latter is more difficult to establish. As an example, economic gain from a swamp may be measured in terms of the sale of all its timber or its value to fisheries, hunting, recreation, and managed lumbering. Management practices may be directed toward trying to achieve the best balance between a short-term gain and long-term productivity. Long-term productivity includes the direct ecological, climatological, recreational, agricultural, engineering, and aesthetic values of vegetation. While it is difficult to translate some of these values into economic terms, their importance to the economy is unmistakable. The following needs are positive steps toward insuring the long-term productivity of botanical resources.

1) Inventory the agricultural, habitat, and recreational resource acreage of the parish.
2) Rank these for intensity of use—highest, moderate, least.
3) List parameters and conditions (e.g., water quality) which are absolutely necessary to maintain each type of plant community.
4) Determine what activities can occur in each area that will least compromise the quality of the resource.
5) Identify features of the environment which are directly dependent upon vegetative resources.

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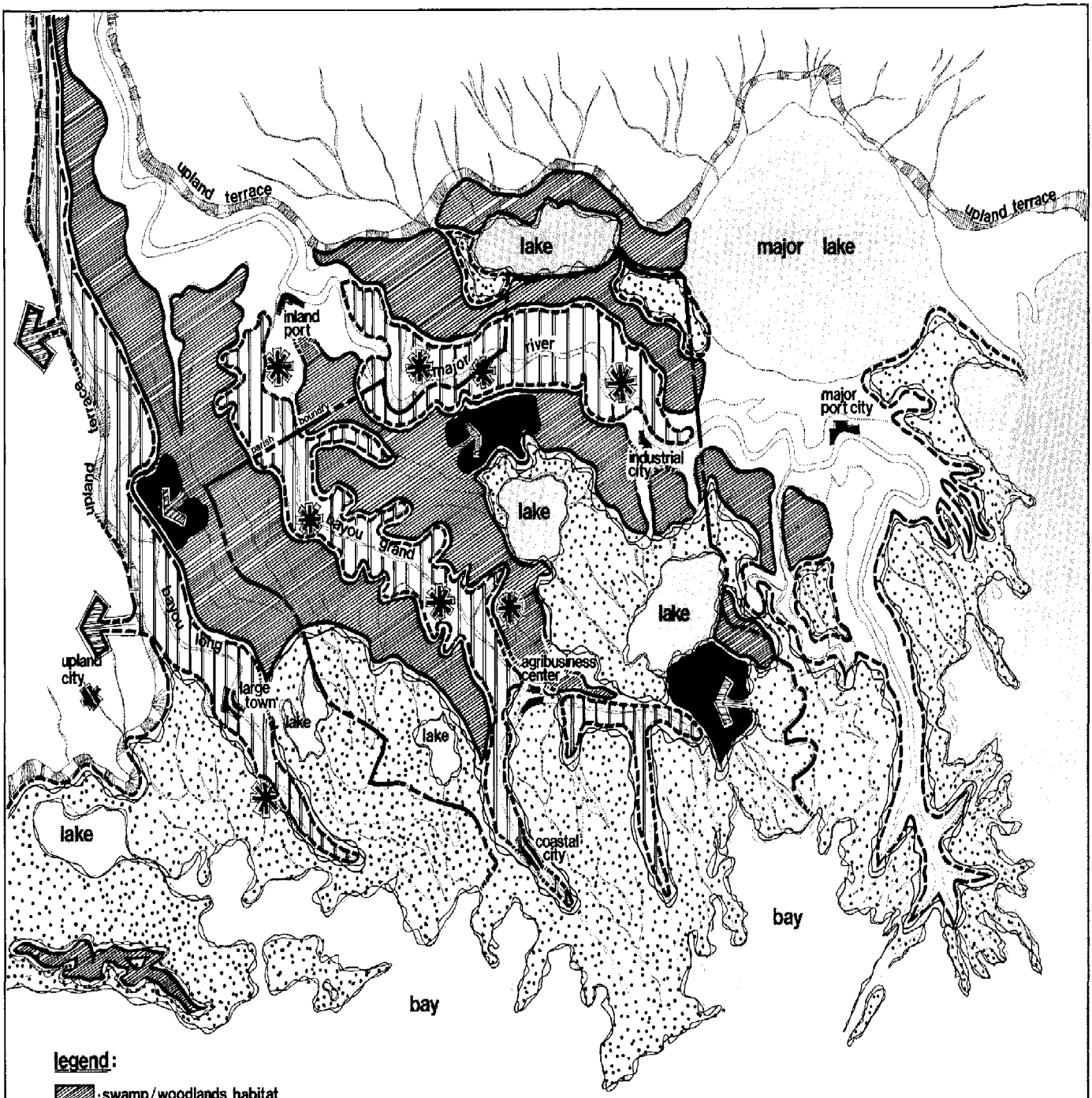

legend:

- swamp/woodlands habitat
- agriculture
- estuarine nursery area
- important communities
- important specimens

botanical resources.

1 sq. mile

0 5 10

scale : one inch equals ten miles

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wildlife and fisheries habitats

communities and habitats

Animals and fishes are extremely dynamic components of the natural environment. They are able to move over the range of their territory and to make limited adjustments to changes in habitat. They, like plants, however, reside in areas whose characteristics are best suited to their needs. Thus, we may speak of wildlife associations in much the same way as we do of plant associations. The various wildlife populations fluctuate in accordance with the supply of food, number of predators, and environmental conditions. The food web is a phrase describing how animals eat plants and are in turn eaten by larger animals. Dead organisms are consumed by bacteria and animals which feed on carrion. A wildlife community which is functioning in a healthy manner displays the following characteristics:

1) High species diversity.
2) Diversity of functions within the community.
3) Population structure in balance with food and shelter conditions.
4) A complex food web.

These characteristics enable the community to withstand some environmental stress and to avoid overtaxing available food and resource supplies. The following habitats are key features of the Louisiana coastal zone.

1) Gulf offshore
2) Beach spawning areas
3) Tidal passes
4) Open bays
5) Intertidal marshes
6) Swamp
7) Natural levee ridges

potential impacts

Wildlife may be affected in many ways because of its dependence on all other components of the environment. Species can alter their surroundings in adjustment to external modification only to a limited extent. Any investigation of environmental impacts should include consideration of the following ways in which wildlife may be affected:

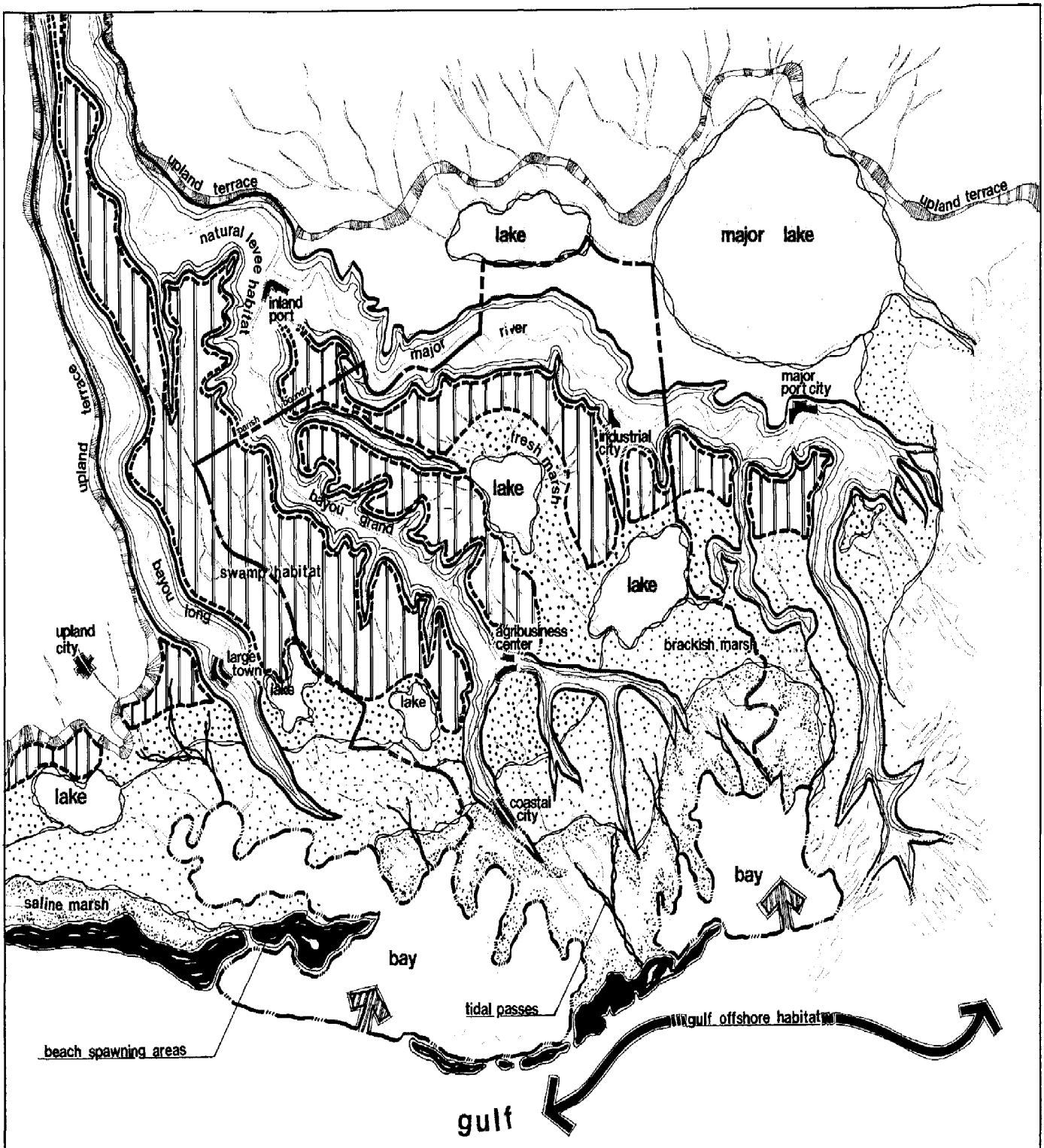
1) Changes in the support structure of water, soil, and air.
2) Changes in availability or quality of habitat.
3) Changes in the food chain or the supply of food.
4) Changes in population structure; destruction of newborns, etc.

These changes can result in the extinction or serious destruction of wildlife species. On the other hand, they may result in the growth of a species to the extent that the habitat can no longer support the new population. Habitats are often overtaxed under these circumstances, transforming a productive habitat into a wasteland. Wildlife populations are more often adversely affected by habitat destruction than by temporary fluctuations in food supply or even environmental stress, such as a flood or hurricane.

intrinsic suitability

Wildlife species are an important component of the biologic and economic balance of the coastal zone. For this reason, it is important to recognize the condition of the wildlife species and habitats in the parish. The following categories indicate the range of concern for the sensitivity of wildlife species:

1) Endangered species require maximum protection.
2) Critical species fill a particular economic or food need and require special management.
3) Important species in the food web are needed to maintain ecological balance.
4) Unhealthy and pest species require special management practices to avoid human illness and control overpopulation.



wildlife & fisheries habitats.

1 sq. mile

0 5 10

scale : one inch equals ten miles

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wildlife and fisheries resources

support value

Wildlife species have important functions in the environment aside from their value to humans. They complete the oxygen-carbon cycles by converting oxygen to carbon dioxide which is used by plants and then converted back to oxygen. Wildlife also breaks down plant biomass by feeding, thus making stored nutrients available again.

renewable resources

Coastal wildlife is valuable to man in numerous ways. Throughout history, wildlife has been a source of food, recreation, employment, and aesthetic enjoyment to people in the coastal zone. The list below lists some of the species man utilizes for economic and social gain. These few species are supported by a much larger food chain base of non-commercial species.

Hunting
Rabbits
Deer
Ducks
Geese

Furs
Nutria
Muskrat
Raccoon
Mink
Otter

Shellfish
Oysters
Blue crabs
Shrimp
Crawfish

Fishing (sport)
Speckled trout
Red drum
Flounder
Spanish mackerel
Atlantic croaker

Fishing (commercial)
Speckled trout
Red drum
Menhaden
Industrial bottomfish

impacts from utilization

Wildlife and fisheries may become non-renewable resources if habitat is destroyed. Excessive harvesting can also affect the ecosystem. The impact of change on one species affects to some degree all others in the community.

short-term vs. long-term productivity

There is a need to conserve wildlife species and their habitats. This management task is often difficult, for once damage is done, the whole system is forced to adjust to entirely different conditions. By identifying levels of sensitivity and managing the activity within sensitive areas, man has the best chance of insuring long-term productivity. Short-term gains and long-term productivity are currently balanced by the regulations of such agencies as the Louisiana Wild Life and Fisheries Commission. A program to insure the long-term productivity of wildlife and fisheries resources would revolve around the following objectives:

1) To insure the perpetuation of wildlife by maintaining the quality of other resources, such as water, air, and vegetation
2) To insure the continuity of biological functions, such as primary production, detritus production, migration, feeding, and spawning
3) To avoid disrupting the food web of the community
4) To monitor supplies, uses, and trends within animal species.

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Louisiana State University Cooperative Extension.
Dr. James Fowler, wildlife.
Dr. Larry de la Bretonne, fisheries.

Louisiana Wild Life and Fisheries Commission.
G. A. Bateman, waterfowl biologist.
Ted O'Neill and Greg Liscombe, fur division.
District biologists.

Parish Agent of Cooperative Extension.

wildlife & fisheries resources

climate

coastal climate

Atmospheric and climatic factors are major forces in the coastal area. Coastal Louisiana is influenced by the warm, moist, gulf maritime air mass and by the cool, dry, continental atmosphere. The interplay between these two systems as they fluctuate back and forth across the state creates coastal weather conditions. Rainfall, wind, and solar radiation combine to provide a humid, subtropical coastal setting.

solar radiation and rainfall

Solar radiation throughout the year helps to account for the high biologic productivity of the coastal marshes. The growing season is long and the days of killing frosts are few. Some years there are no days of frost in coastal areas. Rainfall averages about 60 inches a year in the coastal zone and, coupled with high solar radiation, provides necessary conditions for rapid plant growth. Nevertheless, in late summer and early fall, there is often a freshwater deficit in the coastal area water balance. Evaporation, transpiration, and soil moisture recharge exceed precipitation during these times. As a result, salinity levels increase, and the water table is lowered.The impoundment of rainfall surpluses at other times of the year for gradual release and irrigation during drier months would partly offset the adverse effects of the water deficit.

wind

Wind is an important factor in the control of coastal water levels; in many areas, it is more important than tides. Wind from the south projects water far into the bays, bayous, and lakes of the upper parts of the coastal zone. Winds from the north, on the other hand, may depress water levels in marsh areas. Wind is one of the major forces of water exchange in coastal Louisiana.

natural hazards

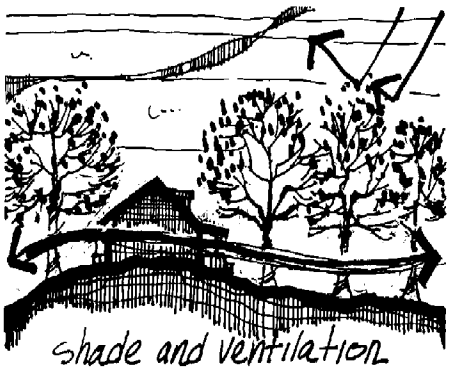
The greatest atmospheric hazard in the coastal area is a hurricane. Hurricanes strike the Louisiana coast on the average of one time every two years. Damage to natural and cultural systems is often severe as high winds, tidal surge, and flooding devastate the low-lying coast. During hurricanes, a great deal of coastal modification may take place. Barrier islands are breached, marshes are eroded, and urban areas are damaged by wind and water.

implications for planning and design

As offshore energy development takes place, there may be increasing demand for development in the coastal area. The use of this area presents two problems with regard to climate. First, the coast is in an excellent position to receive the benefits of high solar radiation and rainfall, such as food production from agriculture and marsh-based fisheries. If climatic patterns are ignored, development can transform these benefits into losses. The alteration of atmospheric processes by air pollution is a good example. Secondly, use of the low coastal area by man is always vulnerable to tropical storms and flooding from intense rainfall, both of which can cause tremendous damage. To guard against these forces, levees and pumping stations are frequently required. In planning and design in the coastal area, there is a need to identify zones of high productivity and potential hazard. An evaluation of these lands might include:

1) high productivity areas—wetland and agricultural areas of high yield;
2) low productivity areas—areas where high yield is not possible because of some limiting factor;
3) high hazard areas—floodplain or other low-lying or fragile areas vulnerable to flooding or hurricane destruction;
4) low hazard areas—higher ground or protected areas relatively free from potential flooding or hurricane damage.

Attempts to modify weather under present technology are extremely costly and, in many cases, unwise for ecological reasons. In addition, trends in the availability and costs of energy make conservation and use of alternative energy sources a top priority. Atmospheric processes may be utilized for their natural capacities to cool, shelter, heat, absorb glare, and provide energy. Man may live in accordance with climatic patterns or make expensive adjustments to uncomfortable and possibly damaging conditions. By taking advantage of natural conditions, he can avoid sacrificing resources in a wasteful fashion.



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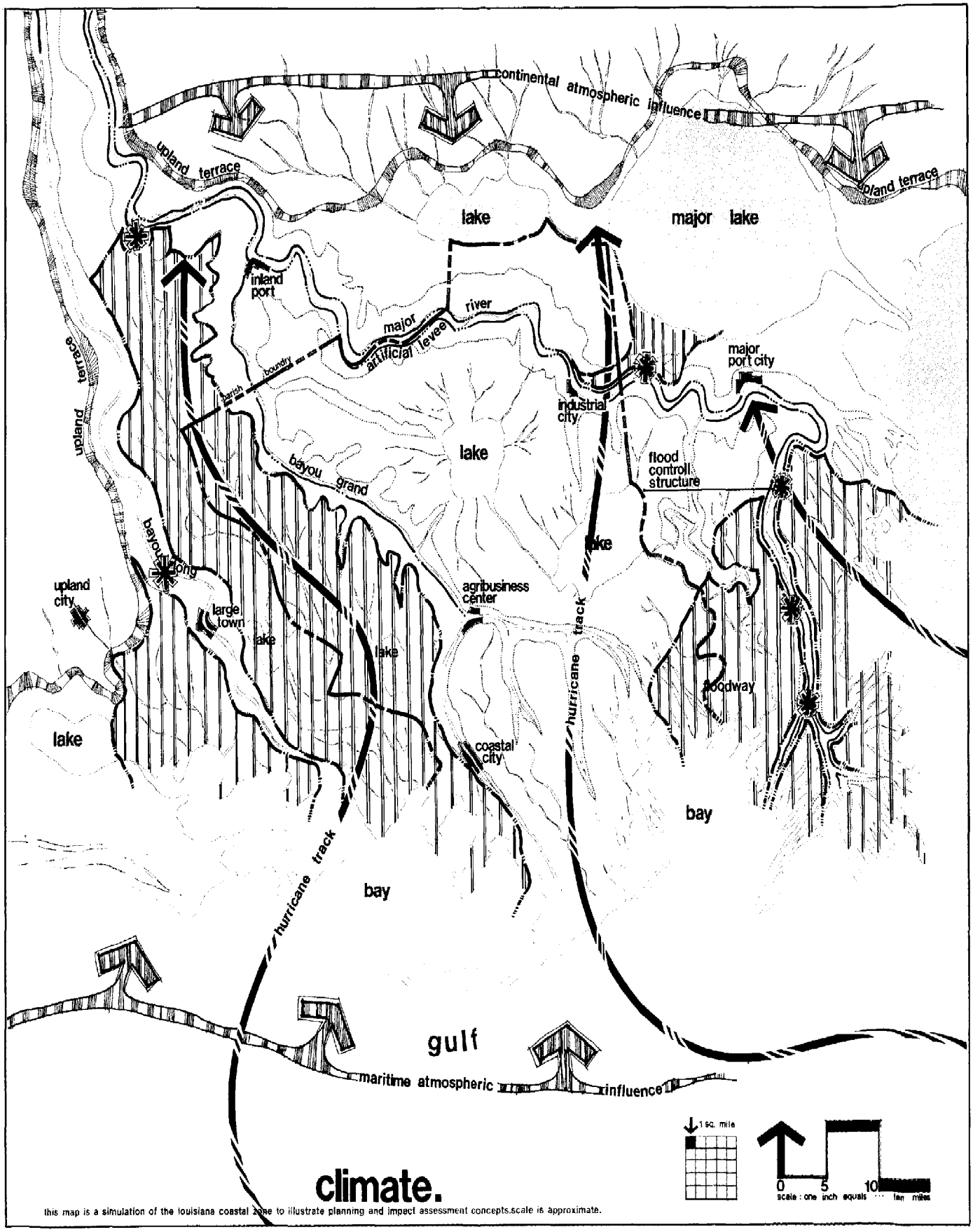

climate.

this map is a simulation of the louisiana coastal zone to illustrate planning and impact assessment concepts.scale is approximate.

cultural inventory

"The present emphasis of coastal planning programs on environmental protection and economic development fails to give broader consideration to social equity and social values. . . . Few coastal zone planning programs specifically relate the environmental and economic programs to the sectors of society which use coastal resources and experience coastal environments."

Dickert and Sorenson, 1974

offshore relationships and economic support

Materials and energy of offshore resources support a large part of the coastal population. Because of the value of the offshore energy resources and the pressing need to develop them, there has been and will continue to be a major influx of people and materials into the Louisiana coastal zone. The coast already reflects evidence of impacts related to offshore exploration and development which have affected both natural and cultural features.

cultural parameters

The consideration of natural parameters in the environmental inventory must therefore be paralleled by an inventory and evaluation of cultural parameters and trends. Man has made modifications to the physical environment for at least the past 10,000 years in coastal Louisiana. This ability to modify the environment has enabled man to survive extremely adverse conditions. Modification has increased significantly in recent years. The forces of cultural change play a very important role in coastal change. The combination of natural and cultural parameters must, therefore, be considered as equal partners in management unit definition and planning. The following parameters are an essential part of developing a cultural inventory:

1) land use and economy
2) cultural history
3) circulation
4) environmental imagery.

land use and economy

The use of the land, location of people, and economy of the coastal zone are closely related. The use of the land depends largely upon its suitability and the pressures of population and economic trends. The land, when well used, supports the population and its economy.

Since prehistoric times, the higher, natural levee ridges along rivers and bayous in the coastal zone afforded man the most suitable areas for settlement. They provided him not only with protection from floods, but also rich soils for agriculture.

Although urbanization and industrialization are expanding along the levee ridges, much of the land is still in agricultural production, primarily sugar cane, which represents over 70% of the total cropland area. Other major agricultural activities involve cultivation of soybeans, rice, corn, and raising livestock. Reclamation of wetlands for agriculture has been attempted in the past, but it often fails, mainly due to the high operational cost of draining the land. Today, many of these areas are flooded and are distinctive features in the landscape.

agriculture

Mechanization and new technologies have brought changes in farming methods. One immediate result has been a decline in the number of farms and an increase in individual farm size. Although farm acreage in coastal Louisiana has steadily declined, agriculture remains an important part of the area's economy.

fisheries

Coastal Louisiana has been blessed with one of the richest fishery resources of the nation. It is the leading state in fish and shellfish production. Among the most important fishery resources are shrimp, oysters, menhaden, and crabs. The crawfish industry is also of considerable commercial and recreational value. This resource abundance is largely due to extensive wetland areas. The majority of fishes in the area is estaurine-dependent, spending part or all of its life cycle in the coastal estuarine complex.

trapping

Trapping is an important activity in the lives of many of the coastal zone inhabitants. The fur industry has shown increased activity in the past few years. Most of the fur animals in Louisiana, including muskrats, dwell in the fresh to brackish marshes. These animals are seriously threatened by saltwater intrusion into fresh marshes. The swamp areas also produce some fur, mostly nutria, which lately has developed a good market. Other fur-bearers sought by trappers are mink, raccoons, and otters.

mineral extraction

The extraction of minerals, such as crude oil, natural gas, salt, sand, gravel, lime, clay, and sulphur, is one of the most important economic activities in Louisiana and the coastal zone. The economic future of the state is heavily dependent on the supply of these non-renewable resources, especially mineral fuels since they constitute 96% of the total value of mineral production in Louisiana.

Oil reserves in the state's coastal zone increased during the 1960s. Offshore exploration and production contributed significantly to this increase. However, a 2.5% production decline for the state was noted between 1971 and 1972. As the national demand for fuels increases, so will the demand put on Louisiana's oil and gas reserves and production. Caution should be exercised in the management of these reserves so as not to accelerate their depletion.

potential impacts from urbanization

Although the character of Louisiana is rural by comparison with the rest of the nation, urbanization is taking place rapidly. The economic and technological developments of the past century have led to a population shift from rural to urban areas. The pattern of urbanization is most striking in the coastal area; four of the six major cities in the state are located here. These areas continue to experience the greatest population growth, especially in the suburbs surrounding large cities. The continued industrialization of the Mississippi River corridor, the proposed construction of an offshore oil port, and continued offshore resource development will contribute to these trends. Industry, commerce, housing, and agriculture compete for the space available on the natural levees. Growth resulting from these development activities threatens the adjacent wetlands.

The land-use map reflects the residential pattern of the coastal area: rural in character with major population concentrations in and around the growing urban/industrial centers. Most of the industrial activity that takes place in this area is directly or indirectly related either to the petroleum or the fishing industry.

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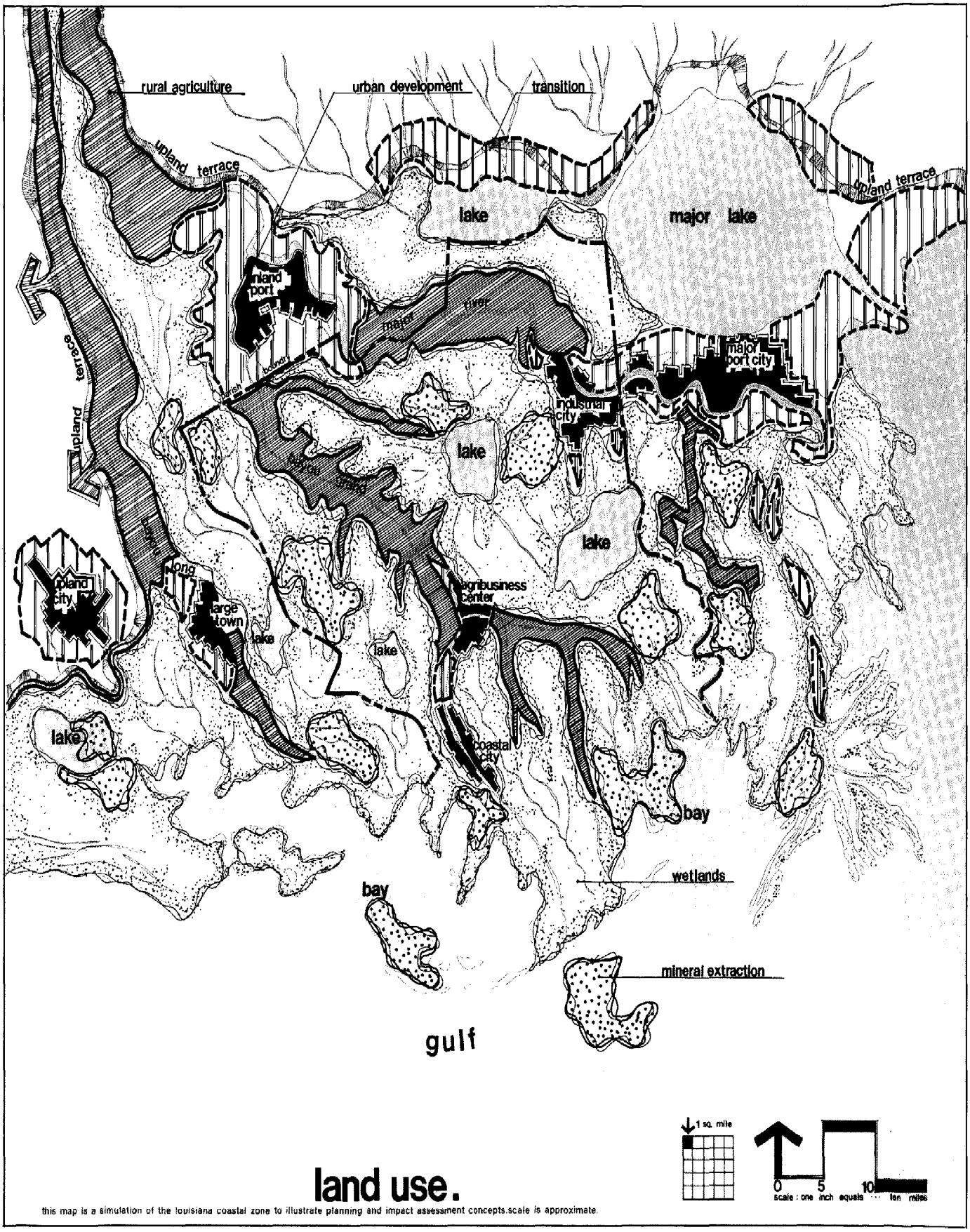


land use.

this map is a simulation of the louisiana coastal zone to illustrate planning and impact assessment concepts.scale is approximate.

circulation

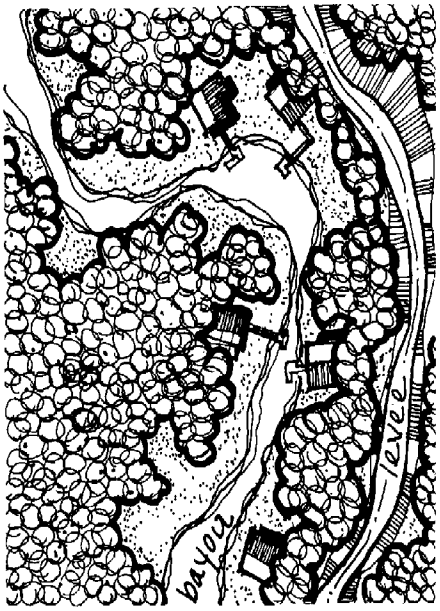
Circulation systems, such as roads, waterways, pipelines, and utilities, tie all land uses and functions together. They are characterized by a hierarchy of four basic functions:

1) Interstate circulation
2) Major arterials
3) Collection
4) Local movement

In the coastal area, roads have historically been restricted to the higher ground along the natural levees next to the bayous or to the chenier ridges of the coastal plain. Circulation across the wetlands has been limited by natural constraints. As a result, cities and towns in coastal Louisiana have been somewhat detached from each other, linked by a circuitous road system.

Waterways were probably the first major systems of movement in the coastal zone and continue to be important commercially. However, like the road system, the waterway system is somewhat limited in the number of routes available from port to port. The Gulf Intracoastal Waterway (GIWW) is the one circulation line that connects major ports in the coastal area.

Pipelines and utility systems are introductions of this century. Because of the major offshore development, coastal areas are criss-crossed by oil pipelines leading to the west, north, and east. Pipelines are laid in shallow canals which are dredged through marsh, swamp, and ocean floor. Utility lines furnish power for industry and other urban uses and are another set of linear elements that run across the coastal landscape.



potential impacts

Circulation systems affect the coastal zone in several ways. The most significant, direct impact is probably on hydrology. The location of circulation systems and their embankment features across wetland areas can block channels and redirect the natural flow of water within wetland basins. Land area is affected greatly by canals and dredging. Each new canal represents an immediate land loss and a continuing loss through bank erosion. Subdivision of the coastal zone by linear elements may also place development pressure on lands that were once relatively inaccessible. Development along circulation links can seriously aggravate coastal problems. If these potential impacts are avoided, the environmental costs of roads, waterways, and utilities can be considerably less.

The most valuable management programs are those which increase the quality of life. Roads should be seen as potentially valuable for the scenery they reveal and settlement patterns they establish as well as for their practical functions. In addition, spoil banks, canals, and physical structures can establish unique wildlife habitats. Proper design and planning can result in positive impacts of linear elements which outweigh the negative ones. Each parish should actively pursue development which utilizes its resources in a way which upgrades the quality of life in that parish. Proper planning and design can maximize the ecological, economic, and visual benefits of circulation systems.

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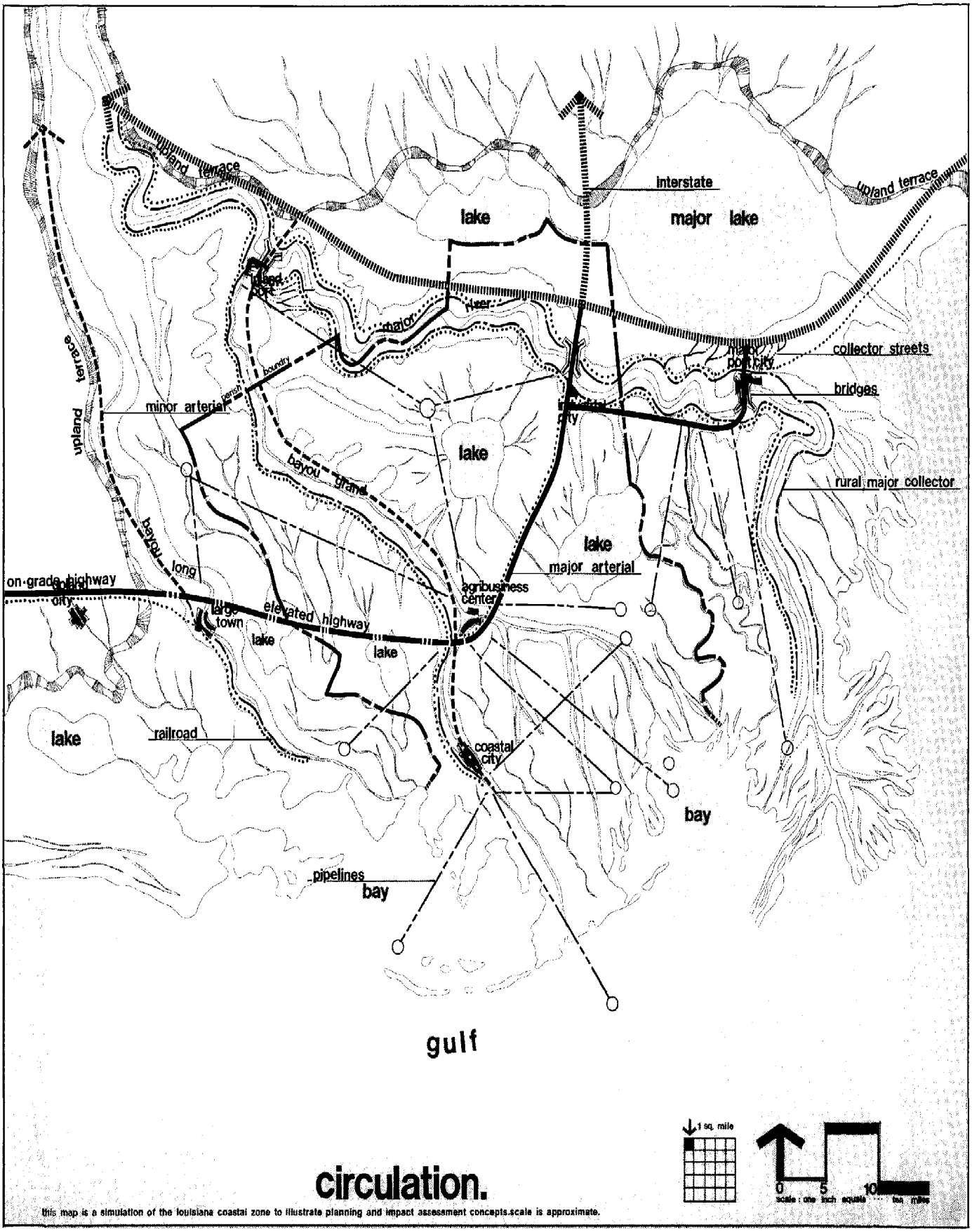
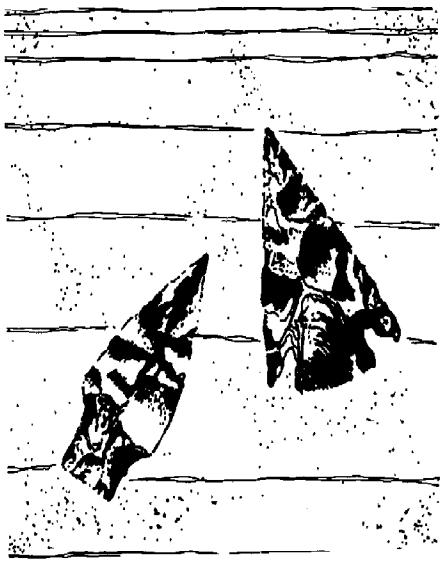


circulation.

this map is a simulation of the louisiana coastal zone to illustrate planning and impact assessment concepts.scale is approximate.

cultural history

Early man was probably directed to the coastal area of Louisiana by the Mississippi River and its tributary system shortly after his entry into the New World. He found a reliable food supply, ease of movement along waterways, fertile soils, and a sub-tropical climate. Conditions were ideal for peoples whose economy was based upon hunting, fishing, gathering, and primitive agriculture.



prehistoric culture

A series of prehistoric cultures has been uncovered in Louisiana. These have been given names based on location and characteristics of artifacts. In the coastal zone, they include the Paleo-Indian, Archaic, Marksville, Poverty Point, Tchefuncte, Troyville, Coles Greek, Plaquemine, and Mississippian cultural groups. These groups have left a rich heritage of artifacts and village areas including projectile points, pot sherds, clay balls, shell middens, and earth mounds. Traces of prehistoric cultures are evident in every parish of the coastal zone. Decline of these Indian cultures began with European contact. Diseases introduced by explorers killed thousands. Later encounters eliminated, displaced, or modified cultures to the point that they were no longer recognizable.

historic times

Historic European culture, too, has a rich background in Louisiana. Controlled in the 1700s by the French and Spanish, Louisiana was purchased by the United States in 1803. It has had influence from almost all European cultures and strong African and Caribbean influences as well. House types, food, language, and names all serve to remind us of this heritage.

potential impacts

Many cultural resources are highly vulnerable to modification of the land. Often archeological sites are not identified until development activity begins. Historical sites are frequently neglected to the point of decay. By that time, it is often too late to preserve them or to make a scientific investigation. This necessitates the use of comprehensive archeological surveys and preservation programs to locate and restore these resources before they are totally destroyed. Although cultural resources are especially important to the community which is related to them, their recreational value to others is also significant.

implications for planning

Coastal management should attempt to identify important cultural sites and evaluate their importance. The materials drawn from folklore and other cultural sources show how people have lived and adapted to environmental conditions in the past. This knowledge shows modern man his cultural roots and place within the continuity of mankind.

Careful evaluation of parish archeological and historical resources is thus essential to management. The types of resources to be inventoried include:

1) areal extent of cultures;
2) linear elements such as trails, shipping lanes, roads, typical coastal settlements;
3) mounds and middens;
4) historic forts, battlefields, and shipwrecks;
5) historic buildings and indigenous architecture;
6) location of historic events;
7) communities of outstanding regional character.

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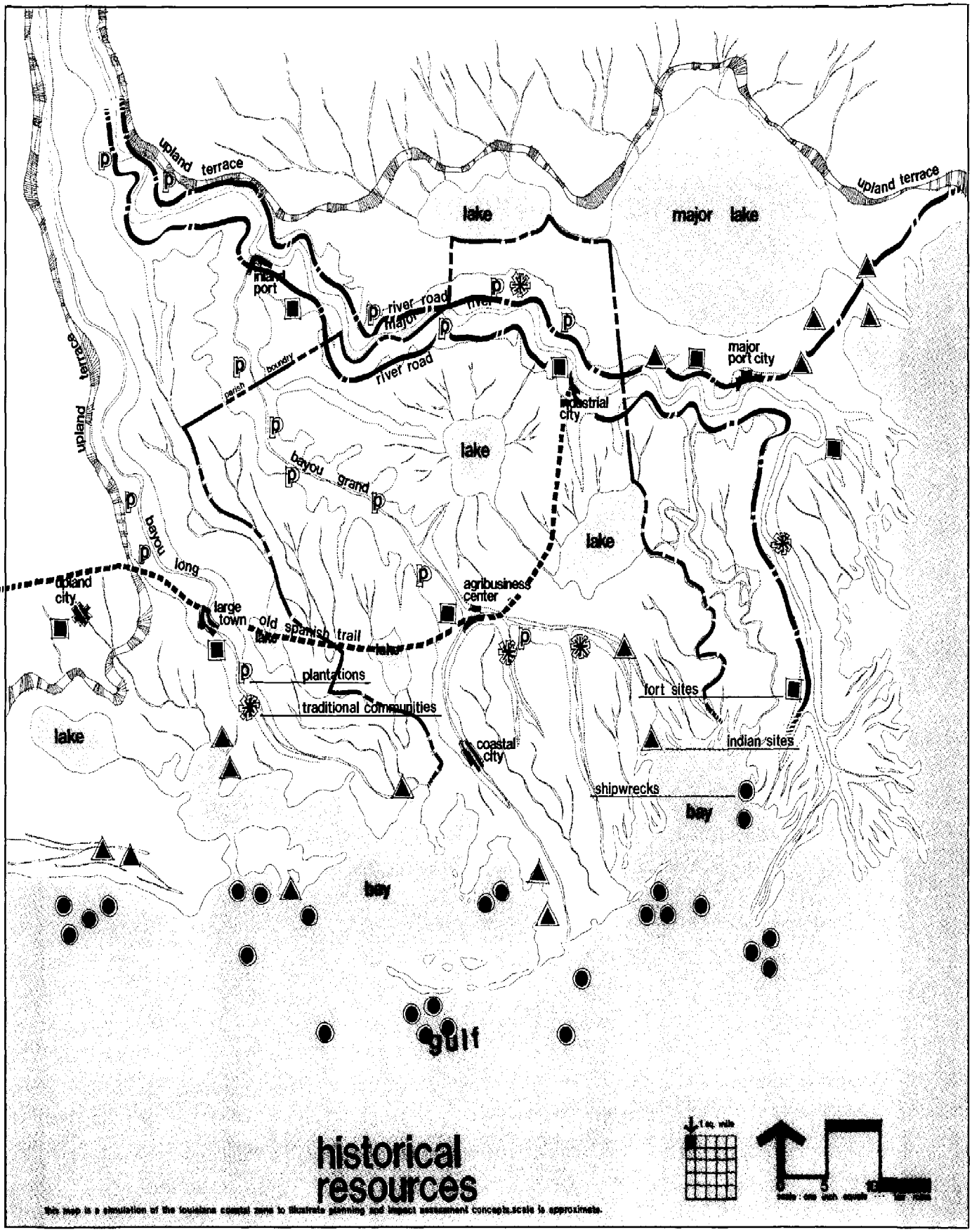
upland terrace
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lake
major lake
inland port
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parish boundary
industrial city
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bayou grand
bayou long
lake
upland city
large town
old spanish trail
lake
agribusiness center
plantations
traditional communities
fort sites
indian sites
coastal city
shipwrecks
lake
bay
bay
gulf
historical resources
1 sq. mile
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landscape imagery

A meaningful management program depends to a large degree upon the way in which the environment is structured and perceived by the people who use it. Environmental imagery is a reflection of man's attitudes and perception of his surroundings. The image of a place, whether pleasant or unpleasant, important or insignificant, conditions our feelings about that place. Many factors, including personality, social values, and physical conditions, shape environmental perception. Taken together, these factors designate some things as beautiful, others as ugly; some places as more important than others. An environmental image therefore reveals not only what is important, but also how significant it is in the mind of the viewer. Similar components of the landscape can have different degrees of importance. On a larger scale, the highway is a more dominating image than a residential street. In a different sense, the residential street might seem more pleasant or intimate than the highway. Thus, there are hierarchies of images which determine our understanding of the landscape.

the lack of a strong image

When a place is said to have no image, several things may be inferred. In one case, the environment may be seen as so boring that little stands out to impress the viewer. Another possibility is that the dominant features of the area, even if only a water tower or an old theater, are perceived negatively. The water tower may be ugly and the theater may be run down, but these things must be recognized as the "character" of that place. If the people aren't happy with that image, then those are the things which they must change. A third possibility is that the area has character and importance, but that it is not recognized. The wetlands of coastal Louisiana are often regarded from this point of view. Since much of the value of the wetlands is indirect and its processes are often invisible, they have been regarded as unpleasant or useless places. When the values of the wetlands are recognized, their image changes radically.

implications for planning

Since images of the environment are an important determinant of the way in which it is used, it is helpful from a planning standpoint to recognize the images, positive and negative, which prevail in an area. This may be done by mapping the features in the landscape which are most significant, obvious, or obnoxious to local residents. This can only be achieved by direct input from the residents. The following categories of features (developed originally by Kevin Lynch) may be used to identify and describe general perception of the environment.

1) Vistas are open spaces with little spatial definition and are part of the vanishing frontier in Louisiana. The marshes and the sea (land-water interface) are examples of unbleminished horizons. Oil rigs and other structures can disrupt this unique spatial feature of the Louisiana coastal zone.

2) Areas are well-defined spaces with boundaries. The physical structure of the parish is made of distinct areas recognized by the people who use them. There should be a close correlation between these areas and the management units delineated for planning.

3) Boundaries can be formed by any number of things; some physical and others implied (political boundaries). It should be noted that political boundaries in "coastal parish" are weakly related to the physical boundaries which exist.

4) Paths in Louisiana take two forms: the roadway and the waterway. When the waterway ceases to be a navigable path, then it becomes more of a boundary.

5) Nodes occur at the meeting of two or more paths. The node, or intersection, is an especially important urban image since it is most often the origin of development.

6) Landmarks are familiar objects in the landscape which help to orient people. Anything can serve as a landmark, but those which are common to most people are generally large, tall, or famous objects.

Identifying the images which define an area is a valuable tool in determining what is important in that area. Places with a strong positive image should be preserved. Places with a strong negative image should indicate a hierarchy of community projects. The community then knows what detracts from its image and can decide what to do about it. Areas without any apparent image can be revitalized or re-explored. The image of the Louisiana wetlands is now readjusting, for example, to fit the discovery of their importance. In each case, the identification of landscape imagery is a valuable part of the process. It is another way of expressing community goals, values, and experience. When these factors are explicitly stated, decisions may be more thoughtfully pondered and made.

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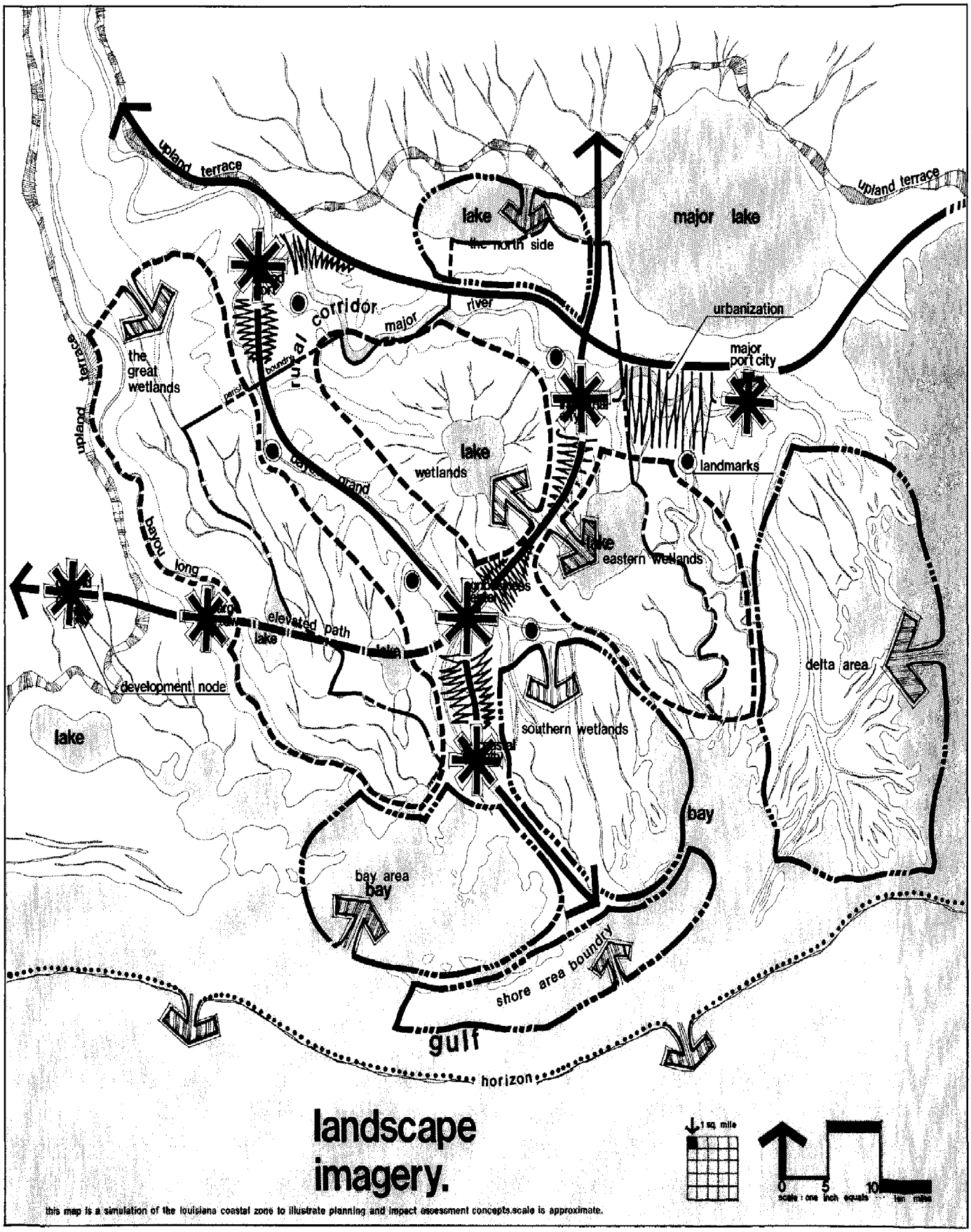
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corridor
major river
urbanization
major port city
the great wetlands
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landmarks
bayou long
lake eastern wetlands
elevated path
lake
delta area
development node
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southern wetlands
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shore area boundry
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scale : one inch equals ten miles
this map is a simulation of the louisiana coastal zone to illustrate planning and impact assessment concepts.scale is approximate.

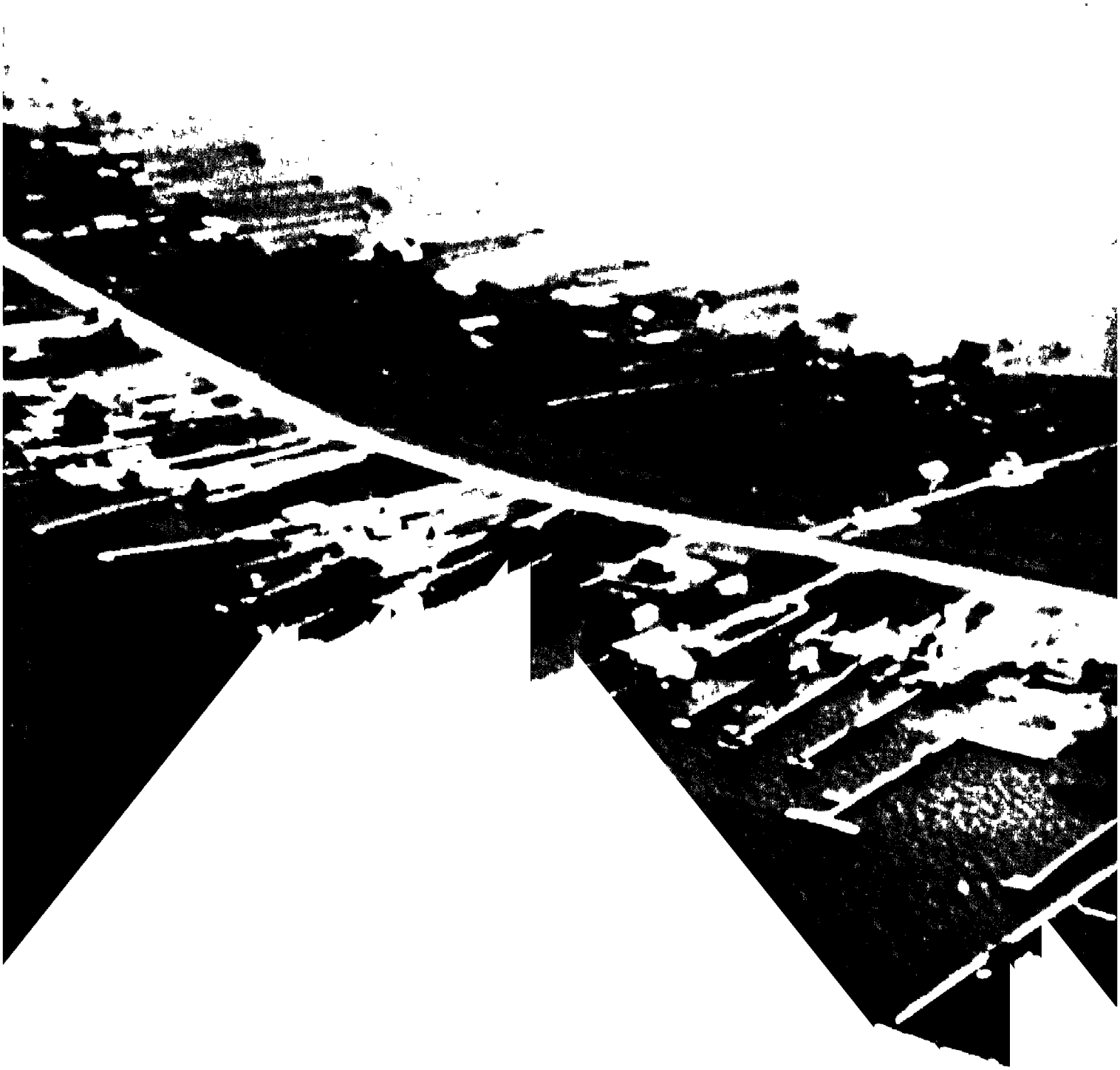
conclusions

Each parameter contributes to the geographic setting of coastal parishes. The particular properties and characteristics of each need to be considered in the evaluation of potential impacts from offshore energy-related developments.

However, no one of these parameters exists independently from the others; they all interact to compose the natural environment. Considering the parameters separately helps to understand ways in which the environment may be disrupted and the chain of events which follow any action. An impact on any one parameter necessarily affects many others.

Some components of the environment are more sensitive to change than others. Damage to the environment is less severe when high-intensity uses are located in less environmentally sensitive areas. Resources are conserved for long-term productivity when activity is restricted or prohibited in areas of greater sensitivity to damage. In all cases, however, there is an upper limit to the amount of modification any natural system can withstand. While man is one of the most flexible components of the natural world, it is apparent that he too suffers from the degradation of the environment.

The resource value of each parameter indicates the close dependence of man upon various features of his environment. The wise use of resources includes restraint as well as exploitation. Management has economic as well as ecological justification. Use of one resource often pre-empts the use of another. The construction of extraction facilities can often destroy other resources in the area. The fact that some resources are irretrievable suggests the need for planning and management in their use.



grouping parameters

Parameters do not exist separately, but interact in a dynamic relationship to one another. The preceding environmental inventory illustrates the association of specific plants, wildlife, soils, and climate. By identifying the regular associations of these parameters in the landscape, it is possible to define simplified components of a geographic system. The breakdown of coastal geographic components is shown in the outline of physiographic components.

Parameters are ranked according to their value in determining the physiographic components of the coastal zone. Hydrology and geology together determine the natural structure of the coastal zone. They, therefore, consitute the fundamental criteria for defining the management unit parameter groups.

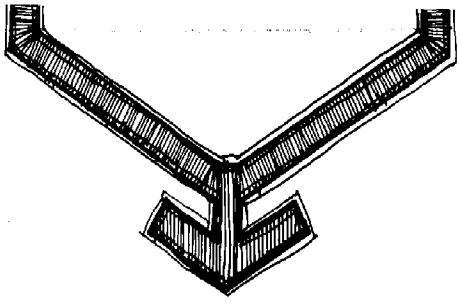
While the location and size of these components may vary, the principles of their interaction are fairly regular. Modifications by man may alter the pattern significantly, for instance, when a portion of swamp land is drained. Vegetation and wildlife must adjust to the changes which have occurred. In some cases, modification is so extensive that the modified areas must be considered as a separate management unit from the original classification of the land.

Institutional arrangements also affect the approach to management and scope of concerns. Government institutions define the political structure of the coastal zone. Local, state, and federal programs play an important role in determining the location and type of actions done under any particular set of physical conditions.

Cultural parameters conform to these associations in varying degrees. Generally, the greater the accordance between cultural, physical, and institutional parameters, the less the environmental impact. By the very act of living (that is, eating, occupying land, etc.), however, the environment is modified. All actions modify the environment. The goal, therefore, is to modify the environment in places and ways which have the fewest adverse physical, social, and economic consequences. To do this one must understand the ways in which physical, cultural, and institutional parameters are associated.

The "tree diagram" below gives an example of how parameters occur in ordered sets. The example shown is for a natural levee complex.

hydrology	levees form the banks of rivers and bayous; well-drained areas; good freshwater supply.
geology	firm foundation; formed by the deposition of coarse river sediments.
topography	highest areas in the coastal zone.
vegetation	water oak, hackberry . . .
wildlife	deer, squirrels . . .
land use	agriculture, urban development, recreation.
circulation	used extensively.
cultural history	primary settlement area; continued through time.
environmental image	development corridor; stable area for human use.
institutions	zoning, building codes; subdivision regulations.



natural levee complex

The features listed above make up the physiographic component called the natural levee. The basic physiographic components and important features which are found in the Louisiana coastal zone follow.

physiographic components

I. upland terrace
- A. valley
  - 1. floodplain
  - 2. channel
- B. interfluve

II. deltaic plain
- A. trunk channels
  - 1. channels
  - 2. towheads
- B. distributary channels
- C. natural levee complex
  - 1. natural levee ridges
  - 2. crevasse splays
- D. interdistributary basins
  - 1. lakes and ponds
  - 2. tidal and drainage streams
  - 3. bays
  - 4. mudflats
  - 5. reefs
  - 6. freshwater swamps
  - 7. marshes (fresh to saline)
- E. barrier complex
  - 1. beach ridges
  - 2. saltwater marsh
  - 3. tidal inlets
- F. active delta front
  - 1. subaqueous levees
  - 2. distributary mouth bars
  - 3. mudflats
  - 4. mudlumps
- G. marginal basin
  - 1. tidal and drainage streams
  - 2. lakes and ponds
  - 3. bays
  - 4. mudflats
  - 5. beaches
  - 6. terraces
  - 7. upland streams
  - 8. freshwater swamps
  - 9. marshes (fresh to saline)
- H. chenier plain
  - 1. chenier ridges
  - 2. shell beaches
  - 3. tidal inlets and streams
  - 4. lakes
  - 5. bays
  - 6. marshes (fresh to saline)

intrinsic suitability

The specific features of each geographic component make it more suited to some uses than to others. For example, levee ridges are more suited to development than saline marshes. The intrinsic suitability of an area is its ability to support specific uses and activities. The chart below takes the geographic components and shows which uses are best suited to each. Each component is capable of multiple use, provided that those uses do not seriously damage the basic character of the area. **H** indicates a high-priority use; **M** a moderate-priority use; and **L** a low-priority use.

	Upland Terrace	Trunk Channels	Natural Levee Complex	Interdistributary Basin	Barrier Complex	Active Delta Front	Marginal Basin	Chenier Plains	Distributary Channels
Urban-Industrial Development	H	-	H	L	L	L	L	M	-
Urban-Residential Development	H	-	H	L	L	L	L	M	-
Transportation Development	H	-	H	L	L	L	L	M	-
Agricultural Development	H	-	H	L	L	L	L	M	-
Resource Extraction	H	L	H	L	L	H	M	M	L
Trapping	L	-	L	H	L	L	M	M	-
Navigation	L	H	-	L	-	L	M	M	H
Recreation	H	L	M	H	H	H	H	H	H
Scientific Research	H	H	H	H	H	H	H	H	H
Wildlife and Vegetation Management	H	-	M	H	H	H	H	M	H
Excess Water Management	M	H	L	H	L	H	H	M	H
Natural Productivity	M	L	L	H	L	H	H	M	M
Erosion Control and Shoreline Protection	M	H	L	M	H	H	M	H	H
Historical Significance	H	H	H	H	H	H	H	H	H
Drinking Water	H	H	L	L	L	M	M	M	M
Fisheries Production	L	L	-	H	-	H	H	M	M
Aesthetic Value	H	H	H	H	H	H	H	H	H

defining management units

A management unit is a well-defined area which, because of its location and features, may be managed for a specific set of objectives. After parameters are grouped into similar sets, physiographic components may be defined on the parish map as management units which provide a concrete basis for long-term environmental decision making. By delineating these units, goals and policies can be tailored to fit the particular needs of the parish and the suitability of the land.

method for defining units

Management units should be defined on the basis of those parameters which most determine the character of the land—hydrology and geology. They are the foundation for patterns of other features, such as vegetation and wildlife. Cultural modifications which alter the nature or use of the land are the final determinants of management unit definition. Thus, the criteria for defining units, in order of their importance, are as follows:

1) Physiography—Hydrology and Geology
2) Secondary indicators—Vegetation, Wildlife, and Others
3) Change Due to Cultural Modification

A second consideration in defining management units is that of scale. Parishes are subunits of larger-scale regions. A large interdistributary basin may be broken down into sub-basins which function similarly to the larger unit. The parish should focus on management units of roughly similar scale. Since management programs extend no further than their boundaries, many large basins and levees are the shared management responsibility of several parishes. This may be seen in management units 1, 5, and others on the map of "coastal parish." When developing goals for each management unit, the people should keep in mind their relationship to the goals of larger scale units on the state and federal levels.

values of management unit approach

The management unit concept has four basic values. First, it provides a descriptive name for an area which is familiar to local inhabitants. The people of the parish can relate more easily to the name "Mirror Marsh Management Unit" than to an arbitrary division, such as "Quadrant 4A." The second value lies in the establishment of a reference for comprehensive planning policy and decision-making. Management unit boundaries, being relatively constant, form a concrete foundation for the development of goals. Goals, resource supplies, and trends can be easily monitored on this basis. Lastly, the management unit concept is applicable to any level of concern—federal, state, parish, or local.

management unit description

The map at right illustrates the breakdown of management units in the model. These units relate to the classification system described under "grouping parameters." The list below shows a basic method for describing each management unit. The **common name** is the name familiar to the people of the area. The physiographic type of component is listed next to the common name.

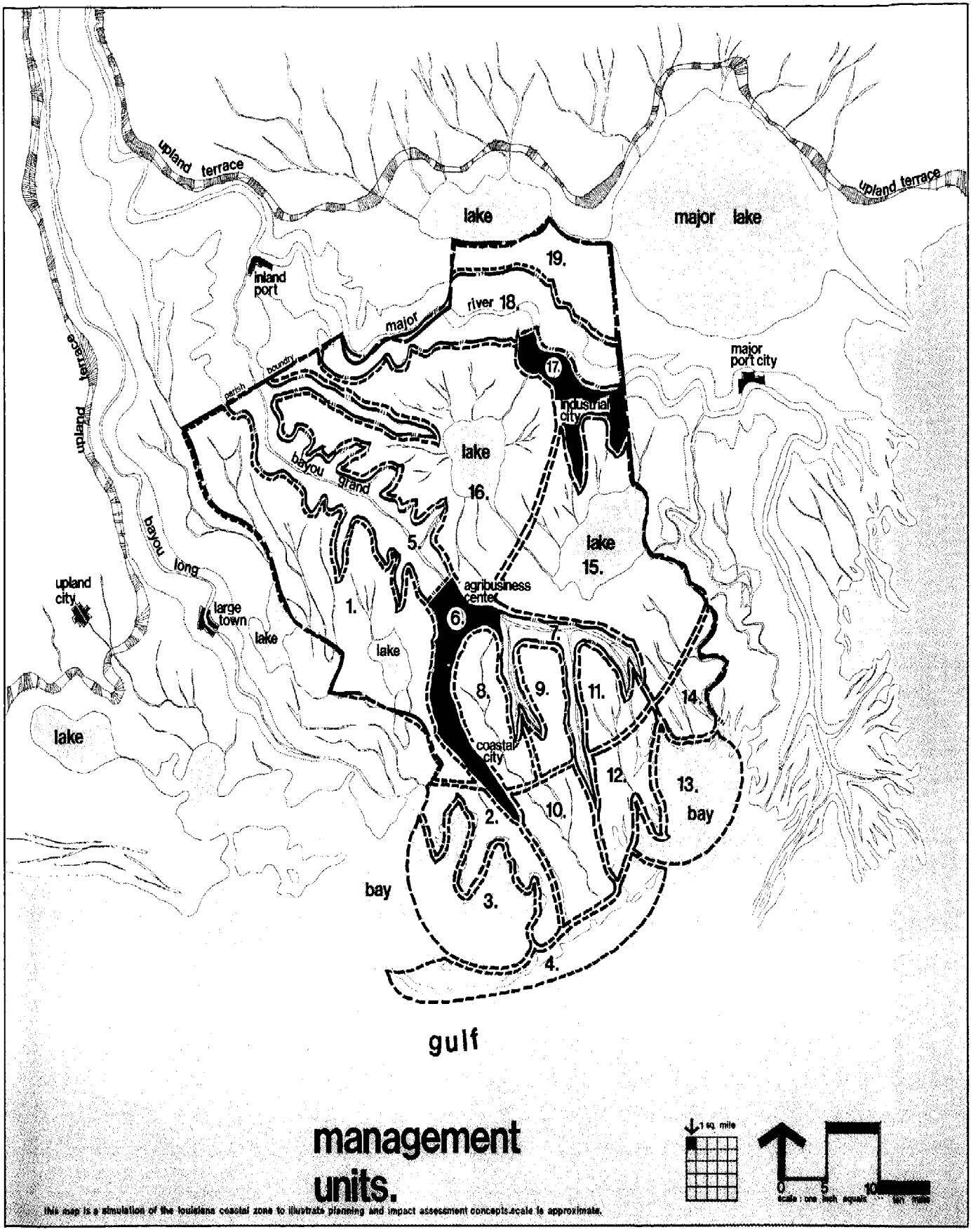
management units

common name	physiographic type
1) The Great Wetlands	Interdistributary Basin
2) Deep Lagoon	Interdistributary Basin
3) Great Bay	Bay
4) Hurricane Islands	Barrier Island Complex
5) Upper Bayou Grand	Levee Ridge
6) The Strip	Levee Ridge
7) Lower Bayou Grand	Levee Ridge
8) Mosquito Nest	Interdistributary Basin
9) Sunken Swamp	Interdistributary Basin
10) Cutters Marsh	Interdistributary Basin
11) Forked Bayou	Interdistributary Basin
12) Mirror Marsh	Interdistributary Basin
13) Delta Bay	Bay
14) Lower Eastern Islands	Interdistributary Basin
15) Upper Eastern Islands	Interdistributary Basin
16) Upper Grand Swamp	Interdistributary Basin
17) Industrial City	Levee Ridge
18) The Cane Belt	Levee Ridge
19) North Lakes Swamp	Interdistributary Basin

Referring back to the inventory and intrinsic suitability data, it is possible to give a detailed description of the environmental condition of each management unit. The description should include the following information.

1) Size of the area
2) Inventory breakdown; eg., hydrology, geology, vegetation, etc.
3) Land uses within the management unit by acres
4) Special features, such as archeological sites, historic features
5) Previous plans for the area
6) Proposed plans for the area
7) Trends, such as land loss or urbanization
8) Intrinsic suitability
9) Public image and social values, such as scenic quality.

This analysis forms the basis for evaluating specific proposals for any management unit.


upland terrace
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river 18.
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industrial city
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bayou grand
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upland city
agribusiness center
6.
large town
1.
lake
lake
7.
8.
9.
11.
14.
lake
coastal city
12.
13.
bay
2.
10.
bay
3.
4.
gulf
management units.
1 sq. mile
0 5 10
scale : one inch equals ** ten miles
this map is a simulation of the louisiana coastal zone to illustrate planning and impact assessment concepts.scale is approximate.

defining goals

In order to make decisions which truly accommodate the needs of the people and the suitability of the land, the parish must develop goals for the use of its resources. It is important to consider not only what is desirable for the future, but also what should be maintained from the past.
Well-articulated goals provide a solid foundation for consistent decision-making.

needs and goals

The goals people develop are largely a function of their needs and desires. The dynamics of human needs have been represented in a variety of ways which give insight into the nature of goals. Abraham Maslow (1959) speaks of a hierarchy of human needs, beginning with the need for food, shelter, and security and culminating in the need for self-fulfillment. "Personal fulfillment ordinarily means reasonable opportunity to develop one's innate potential for creativity and constructive effort for the long-term benefit of himself or herself and society as a whole" (the Pacific River Basin Commission, page 27). As more material goods are acquired, amenities, or intangible goods, such as clean air, scenic beauty, and recreation, become more important.

Management goals focus on both material needs and amenities. Economics and ecology, when linked together, provide optimum conditions for both material security and personal self-fulfillment. An environmental management program should attempt to balance these two sets in a way which upgrades the quality of life in the parish.

Goals are most representative when developed by a wide range of interested parties. A cross-section of participants in the goal development process has a greater chance of covering the full range of ecological, economic, and cultural concerns. On the parish level, this planning group would include parish officials, local officials, parish planners, and concerned citizens. The group may draw on information compiled by the state and on the services of planning consultants in order to aid in formulating or stating goals.

types of goals

Different types of goals are necessary to cover the range of issues involved in environmental management. On the broad scale, there are comprehensive goals the parish should adopt to provide a foundation for parish planning. These should be drawn up at both the parish and individual management unit levels.

I. Comprehensive Goals
   A. Ecological
      1) Process for environmental management
      2) Resource evaluation and monitoring
      3) Preservation, development, and multiple-use policies
      4) Pollution-control policy
   B. Social
      1) Parish character—visual and social image
      2) Population demands and growth
      3) Housing character, types
      4) Community interaction and public health
   C. Economic
      1) Economic development program
      2) Economic value of parish resources
      3) Parish source of revenue
   D. Extra-parish concerns
      1) Management units shared by parishes
      2) Institutional programs on federal and state levels
      3) Offshore and related development

With this perspective, more specific functional goals may be developed which relate to each management unit.

II. Functional goals
   A. Ecological
      1) Air and water quality standards by management unit
      2) Restoration plans for specific critical areas
      3) Multiple use guidelines in moderately sensitive areas
   B. Social
      1) Urban design and development standards
      2) Public Health facilities and programs
      3) Education and public services priorities by management unit
      4) Archeological and historical restoration projects
   C. Economic
      1) Tax base strategy
      2) Economic values within each management unit
      3) Mitigation of adverse impacts and trends

developing goals

goal determinants and statements

Goals should not be set which do not reflect the needs of the people and the suitability of the land. Frequently, however, human needs conflict and are pursued to the detriment of the environment. These conflicts are best resolved by reference to stated goals. For this reason, it is essential that goals be clear and logical. By understanding the factors involved in the environmental goals (the goal determinants), organizing them in a systematic way, and stating them outright on the basis of each management unit, it is possible to conduct parish decision-making in a rational, creative, and democratic fashion.

Goals are based on a wide variety of sources, including available geographic information. Although they can be outlined and discussed before all data collection is complete, they are most valuable when reviewed and adjusted as more information becomes available. The list below indicates how goal determinants are derived and what their role is in the planning process.

inventory of determinants

1) Intrinsic suitabilities of management units
2) Physical trends—rates of change in critical areas
   a. Erosion
   b. Subsidence rates
   c. Water quality
   d. Biological productivity (commercial, sport, and ecological)
   e. Probability of flooding
   f. Air quality
   g. Salinity fluctuation
   h. Species population trends
   i. Freshwater availability
   j. Natural hazard likelihood
3) Social and economic trends
   a. Population growth/decline and composition
   b. Urbanization
   c. Changes in land use
   d. Recreation and tourism
   e. Change in economic base
   f. Structure of tax base
   g. Change in revenue (parish-wide and per capita)
   h. Quality of education
   i. Resource supply/demand relationships
   j. Development opportunities and alternatives
   k. Services capacity and percent used (schools, water, roads, energy, etc.)
   l. Land ownership pattern
   m. Social values
      1. Previous goals, plans, policies
      2. Individual background and social heritage
      3. Archeological and historical resources
      4. Positive attitudes towards natural and cultural resources
      5. Local laws and ordinances
      6. Perception of new directions and future of the parish
      7. Negative views of parish or environment
4) Institutional parameters
   a. State regulations and assistance
   b. Federal regulations and assistance
   c. Local regulations

These determinants provide a broad view of environmental issues and potential. Different people will rank these factors in different ways. Recognizing this fact is an important first step in understanding opposing points of view. If the goal determinants are acknowledged, compared, and argued, there is a better opportunity for conflict resolution. This approach leads naturally to a statement of goals.

stating goals

When stating goals, the people of the parish should focus on seven basic guidelines. Taken together, these guidelines insure that the goal statement is best related to its purpose.

1) Describe the goal and its rationale.

2) Specify the particular location and concern.

3) Quantify insofar as possible the extent of change and conservation to occur and the standards which apply.

4) List prerequisites and implications such as funds and new developments.

5) Schedule process. Many goals require a considerable amount of time and are best approached in phases.

6) Maintain flexibility so that goals can develop and change as conditions change; sometimes goals can be accomplished through different means.

implementing goals

Once stated, goals can be implemented in a variety of ways. It is important to base the technique of implementation upon the nature and objectives of the goals. Certain goals require more information than others. Others require extensive administration. Choosing a policy option which fits the importance and type of goal is essential.

policy options

The policy options which are available to the parish range from direct control of the land to public relations efforts. The list below describes this range of options.

1) Acquire land. The parish may wish to acquire land for a variety of reasons, including public access to scenic and recreational areas, easements for public works projects, and management of sensitive areas. This technique requires considerable funds and discretion for "just compensation," but is also the most effective technique of public control over the environment. Land may also be leased by the state or parish government for uses such as wildlife management. This is a less costly way of implementing a management goal which requires a substantial amount of land and public control.

2) Regulations. Another means of direct control over activity in the coastal area is legal regulations and restrictions. Guidelines may be given greater authority in the form of ordinances, such as zoning, land-use, air quality, and health standards. It is essential that regulations be directly related to the desired goals. Specific standards must be provided for clear interpretation. If a regulation is arbitrary, overly restrictive, or misapplied, it can jeopardize public feeling toward the goal itself. To have any value at all, regulations must be enforced at the local level.

3) Moratorium. In cases where environmental damage is very extensive, the rate of change in an area extremely great, or the costs of regulation too high, a moratorium on activity may be imposed. This is generally a temporary technique used to gain a better view of the changes and impacts which are occurring.

4) Transfer of development rights. Recent innovations in resource management have focused on techniques such as the transfer of development rights. Simply speaking, this involves granting a developer concessions for coordinating his development with local goals. For instance, if a developer agrees to keep 50% of his development in green space or a natural setting, he may be allowed to double the density of his units in the remaining 50% of the property. Similar "transfers" may be arranged between owners of ecologically sensitive areas, historic landmarks, and scenic areas. More complex schemes involve the actual purchase and exchange of development rights (see Rose, 1975). This is far less expensive than acquiring land and can result in equally "just compensation."

5) Permits. The permit process has several values as a management technique. First, it tends to reduce the volume of regulated actions. Second, the number of permits issued are a good indication of the level of use in an area. This is valuable information for monitoring and scientific management. Finally, the permit process allows the greatest flexibility in project review while maintaining control in critical areas. The negative aspects of permitting are its excessive paperwork and high costs of enforcement. This meets strong public opposition when misapplied. When applied to specific goals in well-defined cases, however, it can be the best implementation of a **multiple use policy.** The sale of permits also provides the opportunity to distribute the costs of management to the users.

6) Guidelines and assistance. In some cases where the effects of an action are unknown or the costs of enforcement too high, the best technique is simply to make suggestions of mutual interest to the parish and the user. If these suggestions and assistance programs are well publicized, they can be highly effective.

7) Trade-off and compensation. When adverse impacts are unavoidable, or the benefits undeniably more important than the losses, the best policy can be to accept the losses and plan for mitigation or compensation for the damages done.

The appropriateness of each option varies from case to case. Direct action, such as the acquisition of land, is both more effective and more costly than indirect policy options. The costs of issuing permits and enforcing regulations can also be high, but are lessened when incorporated into existing enforcement programs. The parish has a primary responsibility in the enforcement of public policy. The least direct action, that of making suggestions, is often the least effective. This option involves the costs of accumulating and distributing information. Local government must select a set of policy options which will be most effective within their financial capabilities. The lack of effective policy is just as wasteful and destructive as an overly restrictive policy. The priority of the environmental concern, funds available, and the response of the people to the issues will determine the options which must be selected.

structural alternatives

The structural alternative to implementing goals involves the planning, design, and engineering of manmade solutions to environmental problems. Roads and canals, for example, are familiar structures for achieving circulation goals. As the field of coastal engineering develops, more structures are being designed to reinforce environmental processes, restore deteriorating management units, and protect man. Some of these structures are described below.

1) Revegetation of Dunes. In this case, a "living structure" of dune grasses and shrubs is established to minimize wind and water erosion on barrier islands. In public beach areas, this action must be accompanied by a restriction of activities in sensitive dune areas.

2) Barrier Islands. Manmade barrier islands simulate the protective function of natural ones. The island buffers an eroding shoreline against wave action. At the same time, the exchange between fresh and salt waters, so vital to the marsh, is not obstructed.

3) Revetments. The shoreline itself may be stabilized by loose reinforcement, or revetments. An aggregate, such as shell, lessens the impact of the tides upon the shore. This technique is especially useful at the mouth of a navigable waterway, where erosion is often severe.

4) Groins and Jetties. These are employed to trap the flow of sediment along a shoreline in order to establish beaches or to prevent their flow into a navigable channel. The greatest drawback of these structures is the loss of sediments and aggravated erosion further down the coast.

5) Freshwater Diversion. Saltwater intrusion is a serious problem in Louisiana estuaries, aggravated by channelization and the control of floodwaters. The trend may be alleviated by diverting fresh river waters and dispersing them throughout the estuaries in a way which parallels natural freshwater flow. It is essential that waters be used whose quality would not have serious adverse effects on the wetlands.

6) Controlled Diversion. Artificial levees have virtually eliminated the deposition of new soils in much of the coastal area. As a result, the rate of subsidence is unchecked. A controlled diversion redirects river waters into a deteriorating area, causing a buildup of new sediments. This program can be combined easily with that of the freshwater diversion.

7) Weirs and Variable Control Structures. Structures across stream channels have been used for quite some time in Louisiana to maintain swamp and marsh water levels; that is, to control the flow of drainage and thus manage the habitat.

8) Flood Control. The early settlers in Louisiana realized the need to control floodwaters by constructing artificial levees, spillways, and drainage systems. The benefits of these structures are obvious. The discussion above points out limitations and negative effects which have also accompanied them. More sophisticated flood control structures should be designed to work in harmony with the natural processes of sedimentation and hydrologic exchange.

9) Monitoring Programs. Air and water quality monitors can be employed to implement specific goals and standards. They should be located in positions which reflect controlled data; for instance, air pollution downwind of an industrial development, water quality at a sewage treatment outlet, etc. Monitoring programs are also valuable for the information they compile on physical trends and resource capability.

10) Artificial Reefs. Manmade fishing banks or reefs can be established by judicious placement of bulky objects on the bottoms of lakes and bays. Old automobile bodies have been successfully used for this purpose.

11) Circulation Improvements. Productivity of wetland units may often be increased by restoring natural water circulation patterns through channel clearing and minor dreging.

12) Use of Dredge Spoil for Marsh Building. In some areas, dredge spoil may be used in a very effective manner for establishing new marshes and reviving those that are deteriorating. This is done by allowing hydraulic dredge spoil to spread or splay out into selected areas.

Each of the structural alternatives described aims to achieve one or more goals. In each case, there is potential for environmental damages which exceed the problems of the original conditions. Therefore, it is essential to evaluate the consequences of any structural proposal before it is implemented. In this way, goals may be achieved without creating new problems.

local funding methods

The implementation of public goals requires regular and, often, considerable funds. Rapid development necessitates additional funding for increased services and utilities. While money is available for large projects from federal and state sources, local governments have several techniques of generating funds which can be used to implement goals. Three concerns dominate parish fiscal planning.

1) Getting funds for capital improvement projects, operating expenses, debt retirement, research, and enforcement; primarily achieved by taxes and bonds.
2) Converting future revenues to present worth to expand services, undertake major structural management programs, undertake mitigation of adverse impacts; primarily achieved by bonds.
3) Distributing revenues to blighted areas, to the management of critical areas, to the development of suitable areas, to encourage constructive multi-use management; primarily achieved by special programs.

conclusions

Resource management offers a process for the balance of human needs with environmental concerns. The process attempts to point out and resolve issues of potential conflict in a positive way.

"Such (management) actions are in contrast either to those who pursue single-mindedly one set of societal objectives with no consideration of environmental values or those who pursue narrowly defined 'conservation' goals with no attempt to analyze the major changes that would occur in society as a consequence of radical changes in the **status quo** of human activities and societal development." Matthews, 1976.

The process outlined above is valuable as a method for making decisions. As has been suggested, this method is open-ended. Goals may be formulated and management units considered at the same time base information is being compiled. Moreover, the work is continuous. Social needs, environmental conditions, and institutional structures change, constantly forcing a periodic review of goals and trends.

existing programs and regulations

Numerous state and federal programs to enhance and safeguard environmental quality have been developed in recent years. Legislation at these levels profoundly affects activities in the coastal parishes. Many activities are prohibited, restricted, or subject to permit processes. In addition, programs have been established which give special status to unique or endangered resources.

It may be argued that these programs and regulations are a mixed blessing. On the positive side, they tend to give authority, oversight, and consistency to coastal resource management. They are also a primary source of funds for large-scale public works and the mitigation of adverse impacts. It may also be said that these programs reflect a larger interest and broader goals than those at the local level. On the negative side, it is claimed that federal and state programs interfere with local government, that they neglect the needs of those most affected, that they impose unreasonable restrictions, that they are unsuited to their task at the local level, and that they do not act out of a deep understanding of the area and its special problems. Five constructive points may be drawn from these arguments.

1) It is important to know what regulations currently exist. If these are effective, there is no need to duplicate the effort.

2) However, a new trend in government lies in re-instituting administrative control at the local level. Parish government may be able to capitalize on this trend to accomplish resource management goals in more palatable ways than existing programs. The parish should not seek to assume tasks to which it is not suited, however, such as those requiring extensive funds.

3) Local government and landowners should be aware of the restrictions which might affect their goals and investments. A lack of awareness can be costly.

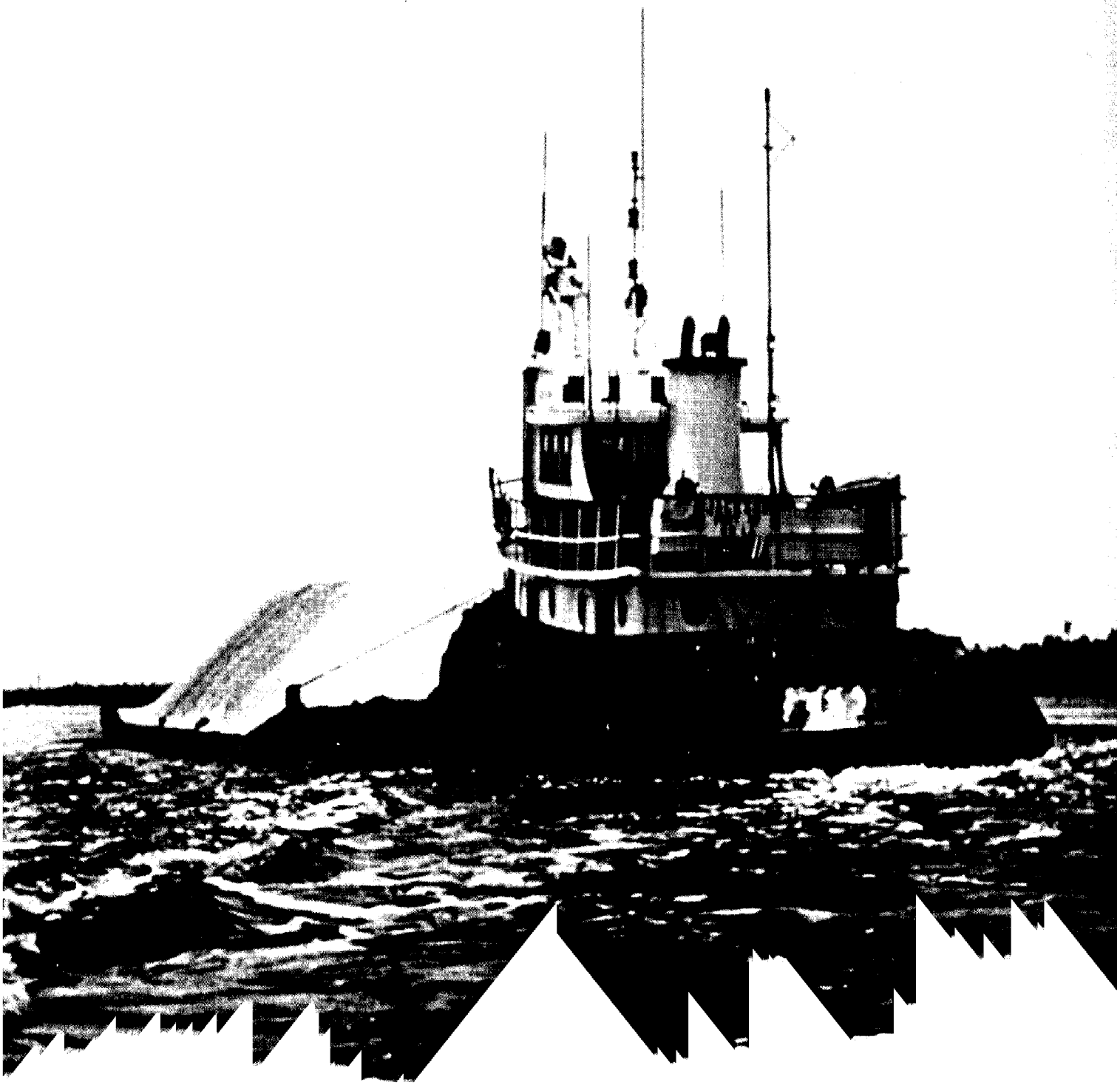
4) Previous management efforts by state and federal governments provide case studies and models from which the parish may construct its own programs and regulations.

5) Some parish programs require special funding, staff, or facilities. These resources at the state and federal level have an obvious value which should be utilized.

A management program requires considerable cooperation between levels of government. Each level is capable of efficiently performing specific tasks in the program. Waste, misunderstanding, and inefficiency result when the balance of responsibilities is uneven. The chart below illustrates the roles of the four levels of government in a local coastal resources management program. It gives a rough picture of the responsibilities and capabilities of each level.

Responsibility of various governmental levels for CZM activities (H = high level of responsibility, M = moderate level of responsibility, L = low level of responsibility).

Local CZM Component		Parish	Region	State	Federal
Staff	Management	H	M	L	L
	Research	L	H	H	M
	Support	H	-	-	-
Programs	Data Collection and Interpretation	M	H	M	L
	Goal Definition	H	L	H	L
	Goal Implementation	H	M	M	L
	Policy Review	H	M	H	L
	Enforcement	H	L	H	L
	Impact Assessment	M	L	H	L
Funding	Permanent	H	L	H	L
	Grants	L	M	H	L



reviewing proposals and assessing impacts

understanding environmental impact

The expression "environmental impact" always refers to an impact upon man. In a broad sense, environmental impact includes the effects of environmental change upon social values and mental attitudes as well as physical systems. Man is either affected by an adverse physical change directly, or he is troubled by the potential loss of resources and beauty. If these changes did not profoundly affect man in one of these ways, he, like other animals, would probably not see them as impacts. The perception of the cause-and-effect relationship between human actions and environmental quality allows him to attempt to harmonize the two.

Environmental impacts are generally considered to be changes brought about by human activities above and beyond the changes which are occurring naturally. Some impacts upon the environment affect man in an apparently positive way, while others seem obviously negative. In reality, any impact has its positive and negative aspects for the ecosystem as a whole. Consequently, the task of impact assessment lies in being able to identify as many of the impacts as possible. After this has been accomplished, rational management decisions may take place based upon an assessment of the impacts. Assessment and decisions are based upon management unit goals and baseline data. The evaluation of environmental impact, therefore, is a logical outgrowth of the planning process presented thus far in the report.

impact assessment and the management process

Planning, design, and impact assessment are related parts of the overall process of environmental management. Planning focuses on **what** needs to be done in order to maintain or improve the quality of life. Design is more involved with **how** things may be done in order to accomplish stated goals. Impact assessment involves the evaluation of an action upon the rest of the environment. Unfortunately, impact assessment frequently occurs after planning and design are completed. However, the Council on Environmental Quality (1973) clearly ". . . requires agencies to build into their decision-making process, **beginning at the earliest possible point** [emphasis added], an appropriate and careful consideration of environmental aspects of proposed action . . . and to . . . develop methods and procedures . . . to insure that unquantified environmental values be given appropriate consideration in decision-making along with economic and technical considerations."

Planning, design, and impact assessment need to be coordinated at the beginning of comprehensive management and specific projects. This coordination may be required of private developers applying for zoning changes, building permits, and funding. Government agencies should also institute management programs which encourage the incorporation of planning, design, and impact assessment.

The coordination of these three activities results in greater efficiency and relevance to community needs. There is often considerable overlap which may be eliminated under an efficient management program. For instance, all three activities involve site inventory, analysis, a statement of goals, and means of achieving goals by specific programs. The site inventory for impact assessment could be drawn from the planning inventory rather than done separately.

It is important at this point to distinguish between an environmental impact assessment and an environmental impact statement. "The assessment and statement differ in purpose and use. The purpose of the environmental impact assessment (EIA) is to provide a basis for intra-agency review of project impacts. The EIA is designed to provide information for judging whether an environmental impact statement should be prepared" (U.S. Army Corps of Engineers Handbook, page 3). The environmental impact statement is currently required only on the federal level. The method for assessment of impacts, on the other hand, can be used for any type of project and covers all of the considerations of a formal statement.

The management approach outlined earlier effectively streamlines the consideration of environmental impact. Properly considered, assessment is a part of the planning process and not merely "added on" after all the planning and design have been completed. In fact, a sound management program can limit the necessity for exhaustive impact assessments. The level of impact investigation could be determined by the level of sensitivity indicated in the coastal resources plan. If the proposed action is in harmony with parish goals and the intrinsic suitability of the site, its impact assessment could be quite brief. In highly sensitive areas, on the other hand, an extensive assessment would be required. The efficiency of this system is readily apparent.

With natural and cultural considerations built into the process, it is possible for a balance between environmental setting and human needs to be achieved. The environmental impact assessment becomes an explanation of the process through which the proposed action was developed—alternatives that were considered, compromises that were necessary, and mitigation procedures used to reduce unavoidable impacts on the various systems. An assessment allows for discussion of OCS-related and other proposals on a rational and systematic basis, considering physical, cultural, and economic factors.

basic considerations

While predicting impacts requires sophisticated technologies and research, parish residents should have an understanding of the basic considerations in an assessment. Parish officials need to be able to critically review impact statements and to add input when necessary. The following pages introduce the types of concerns and problems which are involved in impact assessment.

types of impact

First, there are a number of types of impacts which illustrate the wide range of considerations in assessing environmental change.

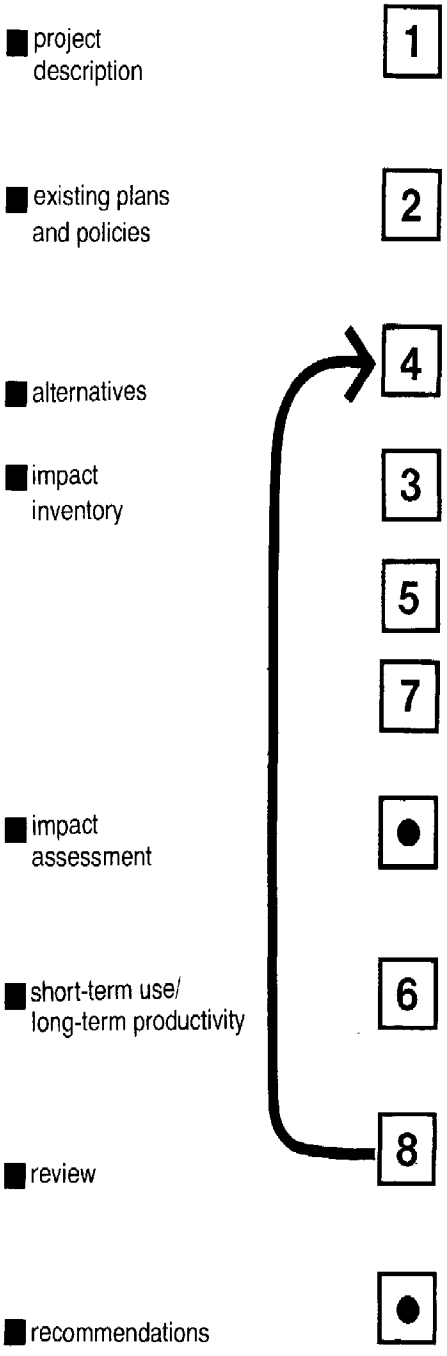
1) **Direct** impacts are a direct consequence of a particular event.
2) **Indirect** impacts result as a secondary consequence of the change (e.g., urbanization from offshore oil development).
3) **Cumulative** impacts are changes which must be considered seriously when taken together (e.g., pipeline canals).
4) **Chronic** impacts are those which occur frequently at low levels, but become serious when they accumulate (e.g., automobile emissions).
5) **Systemic** impacts constitute the overall effect of the changes in the environment.

the impact assessment process

The National Environmental Policy Act of 1969 (NEPA) requires eight basic components in any impact assessment. These are particularly relevant to parish planning.

1) Description of the proposed action.
2) The relationship of proposed actions to existing plans, policies, and goals on federal, state, and local levels. Conflicts should be noted.
3) Probable impacts of the proposed action (positive and negative).
4) Alternatives to the proposed action, including no-action, re-scheduling, plan modification, design, shift in location, and compensation for losses.
5) Adverse impacts which cannot be avoided.
6) The relationship between short-term use of the environment and long-term productivity.
7) Any irreversible or irretrievable commitment of resources (labor, materials, natural, cultural); unavoidable impacts which limit future uses of the environment.
8) Review by the public and appropriate government agencies.

The accompanying diagram illustrates the relationship between the eight requirements and other impact concerns. At the same time, it outlines a method for approaching an assessment of impacts.



the ocs impact example

The impact assessment process can be illustrated by using oil exploration on the Outer Continental Shelf and the resulting onshore effects as an example. The approach by which solutions to complex development issues may be sought, however, is applicable to any example of impact assessment.

The continental shelf is an extension of the coastal land mass. It is defined by the shoreline and an underwater escarpment, as illustrated in the figure below. The area is of special concern to federal state, and parish governments for various reasons, including national security, revenue, and employment. At the present time, the state has jurisdiction over a three-mile area extending from the shoreline, while the federal government has jurisdiction from there to international waters.

Private groups, such as fishermen, shipping companies, and the petro-chemical industry, also have interests in offshore areas. The discovery of fossil fuels in the nearshore regions has been an important supplement to domestic supplies of oil. The pressing energy issue has prompted the federal government to offer ten million acres of offshore lands for oil and gas exploration. Much of the Louisiana Outer Continental Shelf is already highly productive, and significant additional production is anticipated.

Continued development of these lands for oil and gas supplies, if productive, will result in many additional changes, both offshore and onshore. Often, when an opportunity such as this is pursued, onshore effects are neglected until they become serious problems. Thus, the goal of impact assessment is to forecast environmental change, to direct the benefits of the development in the most productive way, and to understand, mitigate, and offset the negative changes insofar as possible.

planning for energy development

Given the rapid changes which can be brought about by Outer Continental Shelf development, it is essential for the affected onshore areas to organize a program to evaluate and respond to the effects of proposed energy developments. This must be done immediately in order to anticipate impacts before they occur. The schedule below provides a rough outline for dealing with local energy-related developments.

3-year schedule

the first three months

determine if potential problems might arise from the development of Outer Continental Shelf resources

formulate initial parish statement and commitment to action (including a schedule such as this)

create a public information group and citizen involvement program (this may be part of an existing program, such as a coastal resource management program)

the next nine months

review existing planning programs

adopt a planning processes which covers economic, social, environmental, and institutional concerns

assign management responsibilities and define relationships to existing government agencies (this includes hiring necessary staff members)

acquire funding through state, federal, and local resources

determine what technical information is available and what is needed

secure technical assistance from federal and state agencies and professional planners to fill voids from above

prepare background studies using in-house and/or outside professional staff

the second year

continue background studies (this can be done as a part of related programs, such as development plans, baseline studies, and resource management studies)

prepare or revise land-use and development plans (especially with regard to public services and growth pattern)

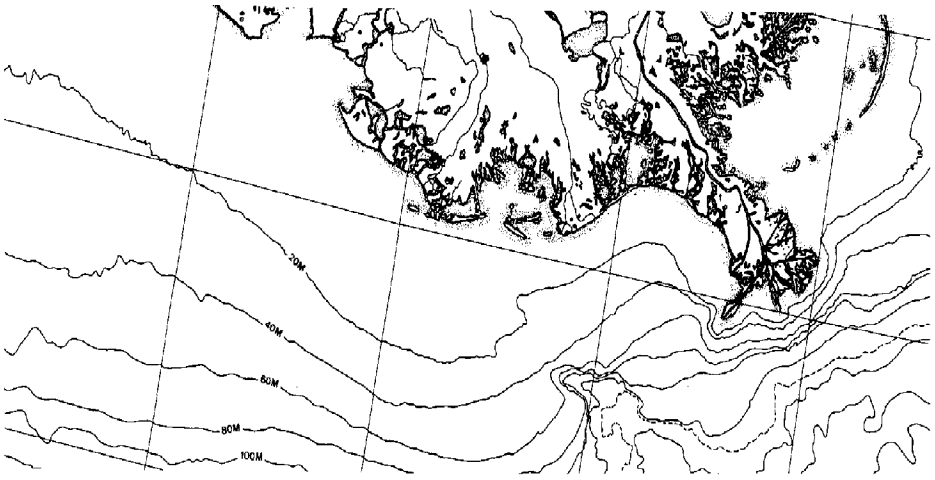
enact citizen participation program

prepare fiscal plans

draft or revise ordinances to accomplish goals

the third year

implement and enforce programs developed above



understanding development objectives

Extensive leasing of Outer Continental Shelf lands comes at a time when the need for new energy sources is felt strongly. This need is due to the overwhelming economic dependence of an urban-industrial society on non-renewable energy resources, such as oil and gas. Since these resources, unlike the sun or winds, are finite in quantity, it is imperative under the present system to discover new resources to support the economy. The supply of energy has to keep up with an ever-increasing demand for it. This relatively unstable energy economy is destined to end somewhat abruptly and with severe consequences if not managed judiciously. The primary objective of OCS development is to support the existing economy while other sources of energy are researched and developed.

Several other considerations contribute to this objective. First, a strong motivation in developing domestic oil supplies lies in establishing economic self-sufficiency in world trade. Oil supplies are an important determinant of foreign policy which the government would like to use to its advantage rather than to its limitation. Secondly, increased domestic supplies generally insure a lower price of energy. This is an important factor in inflation since most sectors of the economy are directly dependent upon the availability and price of petroleum products for their own price levels. Finally, OCS development is motivated by the competitive nature of oil and related businesses. Each company must insure its future by developing new supplies.

As will be seen, the accomplishment of these objectives is complicated by conflict with other OCS uses and onshore needs. In addition, OCS energy development often generates serious economic, social, and ecological impacts in onshore areas. Some of these impacts are unavoidable and irreversible. Others may be mitigated by alternative technologies or design. It is therefore worthwhile to weigh alternatives and variables in the development process in order to avoid the predictable adverse impacts.

A discussion of development objectives raises the issue of alternative sources of energy. This issue should be considered for the following reasons:

1) Oil is a non-renewable resource. While supplies appear to be dwindling, no energy policy exists which would put available oil reserves to the best use. At the present time, the entire economy of the United States is dependent upon the sustained production of petroleum.

2) Exploring alternative sources of energy is an attempt to extend the value of this important resource. Examining the development objectives and alternatives to oil energy should lead to long-range policies.

3) The adverse effects and costs of the proposed action may make the entire proposal undesirable. No-action is an alternative which must be considered in any impact assessment. This requirement demands a justification of the proposed development in view of the impacts which might result. This investigation has two basic values. First, it demands an overall assessment of the costs and benefits of the proposal. Second, it probes the long-range problems of shifting from an oil-based livelihood to other means of energy support.

National interest makes the development of energy resources a high-priority concern. This priority extends beyond the need for immediate development of OCS reserves into the insurance of long-term productivity of all resources Thus, every proposal carries a mandate for efficiency and responsibility; that is, the least impact. In order to fulfill these objectives, it is essential to investigate the proposed actions in detail.

investigation of the proposed actions and alternatives

An important stage of impact assessment consists of delineating the individual actions involved in the proposed activity. These actions will have support requirements which must be provided and characteristics which determine their effect on the environment. After the actions have been identified, their characteristics and requirements may be evaluated. Alternatives to a project proposal are formulated by rearranging those characteristics which are flexible. Likewise, unavoidable impact may be derived from those characteristics which cannot vary.

There are four basic phases, or actions, involved in OCS oil extraction.

A. Exploration. The first 1.5 to 4.5 years are required for exploration, which is accomplished through the use of drilling vessels, geological surveys, and sophisticated technology. This early phase requires few onshore support facilities. The primary onshore needs include small harbors, storage space, and small amounts of local development, such as motels and restaurants. Due to the uncertainty of oil discovery, these needs are often short-lived.

B. Development. The most critical period in parish planning occurs in the 2.5- to 6.5-year period prior to production immediately after oil has been discovered. Peak production will be established between 5.5 and 9.5 years following discovery. If existing facilities cannot accommodate the new supplies and resulting onshore needs, the discovery of oil will bring about rapid onshore development for both primary and secondary services. The extraction industry itself requires the rapid construction and installation of drilling platforms, pipelines, storage facilities, and, at times, refineries. The discovery of gas necessitates early processing onshore for safety. Secondary construction also booms. The influx of workmen creates a need for new housing, commercial facilities, and utilities. Towns expand in size, population, and services.

C. Production. The flurry of new building and development decreases as production levels off and later declines. Fewer men are required to man the offshore rigs, and less money circulates. Some building and maintenance of platforms and pipelines is necessary, but at a much slower pace. Louisiana is currently in this phase of activity. Existing facilities will in some cases be able to absorb the additional demands of OCS development. If OCS lands are especially productive, however, the development process could begin again at both regional and community levels.

D. Decline and Abandonment. Eventually, the field of oil will be exhausted, or rather, it will be economically unfeasible to continue to extract petroleum reserves. The old wells are capped off and left for new prospects, with onshore support facilities often experiencing the same fate.

Understanding this development sequence is central to having a whole picture of the costs and benefits of development.

variables

Understanding variables in the proposed action is the key to determining which problems will be most significant and developing planning and design alternatives. A large number of factors influence the types and magnitude of impacts upon coastal inhabitants. The following list of variables defines the nature of OCS development.

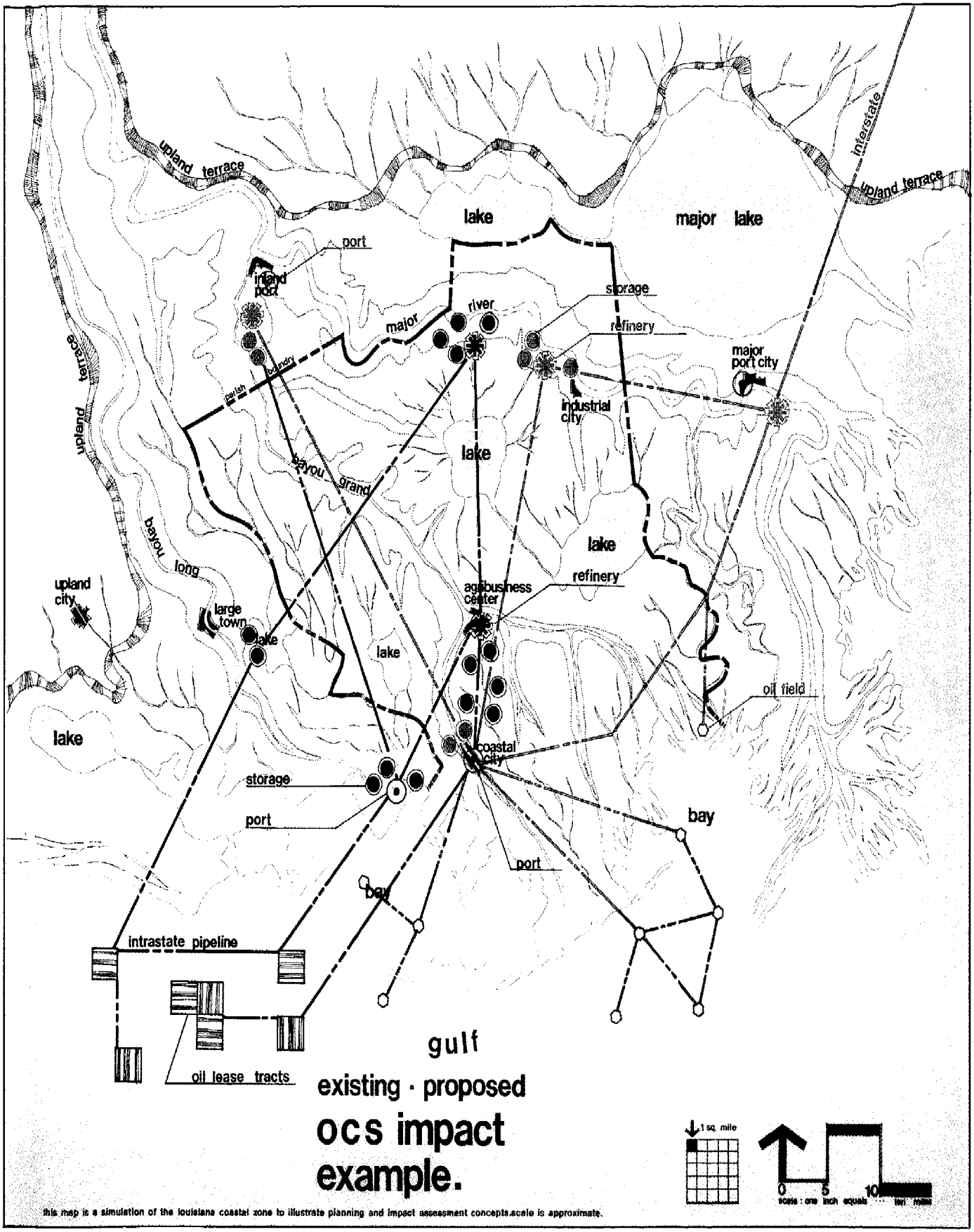
1) Size of the field
2) Location of the field
3) Type of production (oil/gas)
4) Type of crude oil
5) Sea bed and weather conditions
6) Existing onshore facilities—primary, secondary
7) Level of production—high, medium, low
8) Type of extraction methods and equipment
9) Availability of labor and materials
10) Onshore support requirements

Some of these variables are determined by the discovery; others, such as the location of onshore support facilities, may be partially or wholly determined by design and planning. The values substituted for these variables will structure the nature of the impacts which may be expected.

assumptions of the model

The planning model developed earlier will be greatly influenced by the discovery of oil in offshore areas. The people of "coastal parish" have only a partial picture of the effects which will take place and will want to apply the principles that were developed in their previous planning efforts. To predict impacts, assumptions must be made about the level and type of changes that will occur. Several sets of assumptions, or scenarios, can be investigated and compared. The following assumptions are provided for the sake of discussion. They will function as an early aid to the analysis of impacts which may occur.

A. Tract size: five tracts, each 9 square miles
B. Tract location: as shown on map
C. Type of production: both oil and gas
D. Level of production: high in all cases
E. Anticipated schedule:
   1) 1980—discovery
   2) 1985—initial production
   3) 1990—peak production
   4) 2005—production declines
   5) 2010—abandonment of field
F. Existing and proposed facilities
   1) pipelines
   2) storage facilities
   3) ports
   4) refineries


upland terrace
interstate
upland terrace
lake
major lake
port
inland port
storage
river
major
refinery
major port city
parish
boundary
industrial city
upland terrace
lake
bayou grand
bayou long
lake
refinery
upland city
agribusiness center
large town
lake
lake
oil field
lake
coastal city
storage
port
bay
port
bay
intrastate pipeline
gulf
oil lease tracts
existing · proposed
ocs impact example.
1 sq. mile
0 5 10
scale : one inch equals ten miles
this map is a simulation of the louisiana coastal zone to illustrate planning and impact assessment concepts.scale is approximate.

inventory of impacts

Impacts from offshore energy are closely related to the sequence of development activities from exploration through abandonment. The life of the field from discovery to abandoment is only 25 years. The impacts from the various phases of that period are not static, but fluctuate with the level and type of activity. Too often, impacts are evaluated only at one phase or haphazardly during several. Such an assessment tends to emphasize one set of circumstances: either the ecological damage done at the height of construction or the expected income and growth at peak production. These arguments offer limited insight into the true nature of the costs and benefits which accompany offshore development. Only by evaluating the dynamics of the impacts at all four phases in sequence is it possible to understand the implications of the proposed action.

a. Exploration. Exploration is a time of limited impacts onshore. Small numbers of specialized personnel, generally from outside the parish, are involved in the activity. The primary services required include small ports and temporary housing. If oil is not discovered, workers rarely reside in the area long enough to be placed on the tax roles. Some physical damage may result from exploration through drilling operations and the dumping of solid wastes from exploration rigs. Increased turbidity and pollution may affect marine life and vegetation. If oil is discovered, some spillage may occur before the well is brought under control.

b. Rapid Development Phase. After oil has been discovered, a rapid period of development occurs. The construction industry flourishes, especially in building offshore platforms, pipelines, industrial, and residential facilities. Large amounts of employment are generated both to build the required structures and to support the booming population. Money circulates throughout the community. It is important to guard long-term goals of this stage. There may be a tendency to bend or abandon planning goals established earlier; planning priorities and even initial tax revenues may be sacrificed to lure the expanding industries.

Several hard realities offset this idyllic vision of economic growth and development. First, the physical impacts at this time are generally of the highest magnitude. Pipeline and navigation canals are dredged, disrupting salinity regimes and freshwater balance. Land is diked and drained for primary and secondary development. Solid wastes are indiscriminately dumped and water resources befouled. Sensitive vegetation and wildlife are disrupted without regard for their patterns, processes, or importance. Protection from natural hazards is compromised. At the time, these concerns do not appear to compete with the promise of immediate income.

Second, it must be emphasized that increased employment does not necessarily solve economic problems. The case of Alaska illustrates this point well. A tremendous in-migration of people looking for work took place which actually increased unemployment. By the same token, local people are not assured of being able to obtain jobs if the incoming workers are highly skilled.

Third, the increase in population requires expanded services—housing, utilities, roads, schools, hospitals, police and drinking water. Often a small community will lack the resources either in stable land, labor, or materials to meet these needs. Taxes to support the increased services often skyrocket along with the price of lands. As a result, the economic base of the area may be irreversibly shifted from an agricultural or rural base to an urban-industrial one. Change in the entire community image and infrastructure can result from such a shift. From the other side of the fence, a community which is passed over by development for one reason or another often loses its younger people and more ambitious citizens to the new area of development. Such areas may economically die as a result of changes in population and income.

c. Production. The questions above become more significant as time passes. The developing areas may expect the labor-intensive construction activities to subside and revenues to level off. A portion of the unemployed may be expected to leave, having contributed little of permanent value to the area. If the area has not been managed for the issues above, physical and economic damage can intensify.

Precedents established in the period of rapid development can continue ecologically destructive activities. Urban sprawl into farmlands and wetlands continues on past precedent and short-term economics. At the same time, primary impacts of the extraction process begin to be felt. Cumulative effects of chronic oil spillage, dredging, and air pollution are seen in fisheries, game, and marsh productivity. The deteriorating visual quality of the environment begins to be noticed. It is apparent that something must be done to turn things around, but often this desire merely lapses into a nostalgia for the good old days or hope for a revival of the development boom.

d. Decline and Abandonment. The cycle is complete when it is no longer economically feasible to extract oil and gas from the offshore field. If the area has not expanded its economic base beyond offshore-related activities, it can expect serious economic and social troubles. Heavy unemployment and migration to other areas will lower the tax base. If the parish overbuilt for the earlier phases, it will have unnecessary services with little means of financing its long-term obligations. If the parish has not anticipated these problems and managed for them, there may be no solution for the areas affected. The original renewable resource base (which might have been agriculture, fisheries, trapping and/or lumber) may well have degenerated beyond repair by ecological damage done during the development boom. It is clear that the planning process must be initiated at the first notice that leasing will take place. Oil extraction can then act to generate economic development in a broad, beneficial sense.

investigating impacts and alternatives

The map at right illustrates several of the probable impacts of the proposed actions. These examples present a broadstroke conceptual approach to the problem of environmental impact. By investigating alternatives, the most desirable solution to probable impacts may be derived.

Each impact may be brought about by a great number of physical changes. For instance, a decline in fisheries production can result from increased turbidity, construction activities, changes in salinity, destruction of habitat, water pollution, and changes in water temperature. These may take place as a result of many types of mismanaged development. Specific cases are best dealt with by reference to the environmental inventory, parish goals, and process for investigating impacts.

Listing the impacts does not, by itself, provide a basis for decision making. Alternatives must be explored and compared with the original proposal. The development of alternatives can reduce costs as well as impacts, as discussed in example **a.** below. Alternative plans provide an opportunity to lessen or mitigate potential impacts. It must be recognized that alternatives raise a whole new set of impacts for consideration. The examples below, corresponding to the letters a through d on the map, discuss four impacts from, and alternatives to, the proposed development scheme.

a. Pipeline networks. The proposed pipeline development would have a serious effect on the structure of the parish wetlands and bays. Spoil banks obstruct the flow of fresh water in the marshes, aggravating saltwater intrusion and disrupting estuarine conditions. Erosion is accelerated by the increase in land-water interface along pipeline canals. Pipelines produce what are known as cumulative impacts. The first few pipelines have relatively little impact. As more are added, however, the impact of the pipelines as a group becomes more significant.

Alternatives. The number of proposed pipelines could be reduced significantly. The costs of this alternative are often a savings in the long run since the transportation of petroleum products can be made more efficient by tying other pipelines into a main line, thus requiring fewer feet of pipe to reach the shore. When this alternative is not possible, new pipelines should avoid the further breakup of management units by following existing linear corridors. Linear elements, such as roads, waterways, utilities, and pipelines, have a reduced impact if clustered in such corridors. This minimizes the damage done by the construction, use, and maintenance of linear elements in the coastal area.

b. Growth patterns. The pattern of development in the proposed scheme reflects some serious problems for the shore area. The location of the proposed port stimulates additional development on an eroding shoreline. This development also extends into productive estuarine areas. In other words, the development which would link the two ports and spread up "bayou long" would induce urban sprawl where it has the greatest impacts.

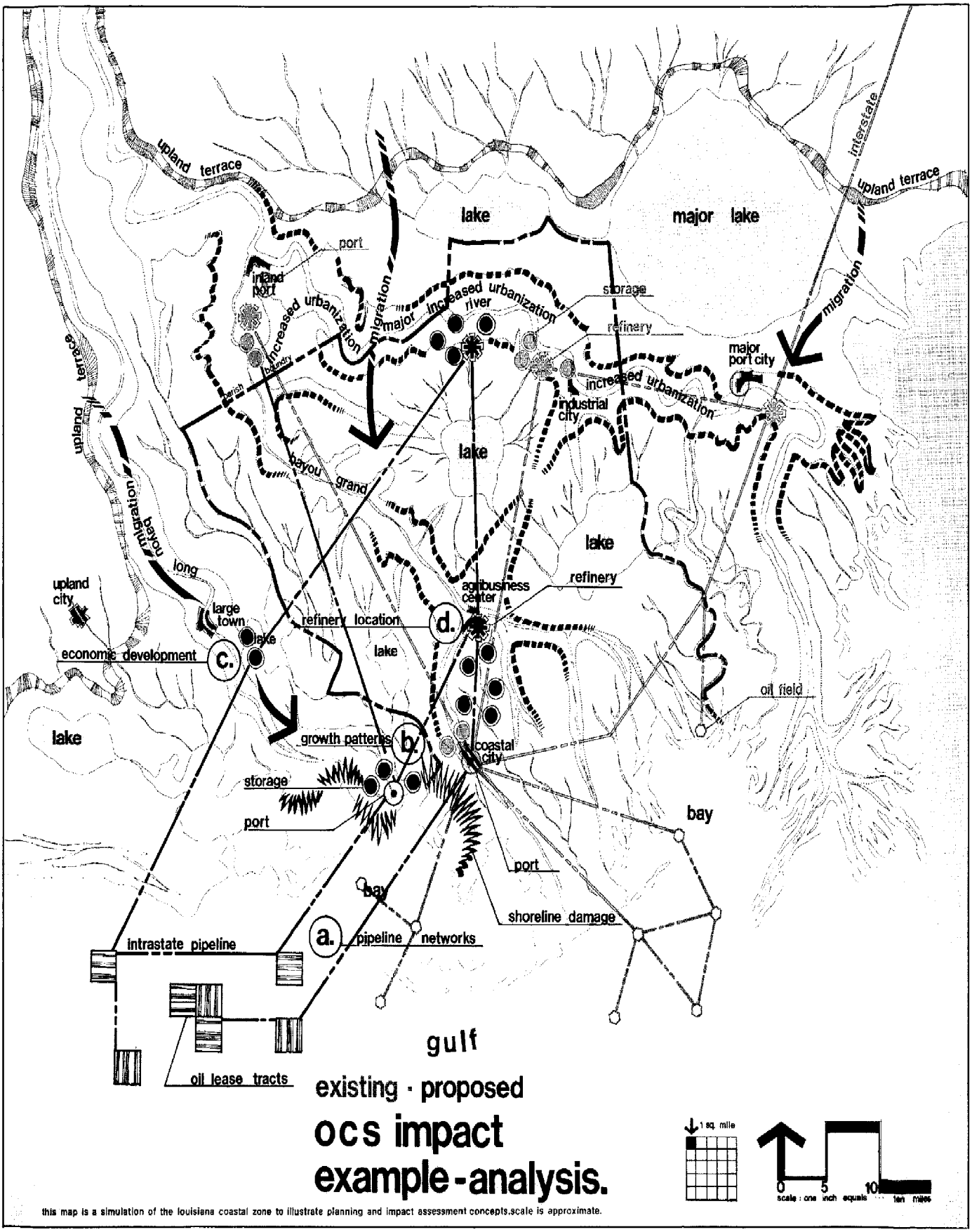
Alternatives. Existing port facilities could be expanded to meet the increased need. This would require fewer structures and less investment than a new port. Erosion could be lessened by limiting it to a single area, allowing the bay to continue as a biologically productive area. By concentrating development, fewer utilities and services would be needed. In this way, the area would have greater potential to be used for multiple purposes. New development could continue on the natural levee (as shown), where it is most desirable. This alternative does not eliminate all potential problems. There may be insufficient fresh water or land to accommodate the necessary growth.

c. Economic development. If the existing port is used, "coastal parish" would gain considerably while its neighbor to the west would suffer serious economic consequences. Workers from the latter who were relying on the new port for employment might have to move to "coastal city." The tax base of "large town" could deteriorate, and the area stagnate economically.

Alternatives. The proposed port on the shoreline could be replaced by a refinery or related business in the vicinity of the "large town." In this way, available labor is utilized, OCS revenues are secured, and sensitive shoreline areas are preserved. The pressure for growth near "coastal city" would also be alleviated.

d. Refinery Location. The proposed refinery in the agribusiness center would radically change the population, character, and economic base of that community. Refinery development here would extend industrial development from "coastal city" to surrounding levees and wetlands. The need for residential and commercial development would increase accordingly. The pressures of this type of development on lower-priced agricultural and recreational lands would be considerable. The original character of the town and lifestyle of its people would soon be lost after such changes.

Alternatives. The proposed refinery could be located on the levees of the major river or in the neighboring parish. In this way, multi-use management of the parish could be continued while an important land use and cultural resource is maintained. Refineries and processing plants do not have to be located on the shoreline itself. Pipelines frequently pass from offshore to inland areas before stopping. This is a desirable alternative when the size of the coastal population overtaxes available resources.


upland terrace
lake
major lake
port
inland port
increased urbanization
migration
major river
storage
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agribusiness center
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1 sq. mile
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scale : one inch equals ten miles
this map is a simulation of the louisiana coastal zone to illustrate planning and impact assessment concepts.scale is approximate.

"Don't it always seem to go
That you don't know what you got til it's gone."

Joni Mitchell

assessing impacts

The assessment of impacts involves a complex judgment of the benefits and costs of a proposed activity in relation to current conditions or alternative activities. The judgment is complex because it is made up of both subjective and objective predictions of change. While making these predictions is difficult in itself, combining them is an absolute necessity for making rational decisions about the feasibility and desirability of a proposal.

Each phase of the planning process aids in making a logical evaluation of environmental impact. Management unit goals, environmental baseline data, and projected impacts all contribute to the assessment of the consequences of a particular action.

Some input into the assessment is entirely subjective. The significance of scenic beauty, lifestyles, small-town character, or an endangered species is based largely upon personal values. The fact that they are not easily measured and highly personal, however, does not reduce their importance. The loss of any of these may be a hidden cost of development, often not valued until it is lost or beyond repair.

The only alternative to this pattern lies in focusing on the things which are intrinsically valuable to parish life in the goals development process. If the intrinsic values of parish life are written into the long-term goals, they can be protected against activities which threaten them.

Other impacts which may be scientifically measured are still difficult to translate into economic values. The quality of air, ecological value of the marshes, and quality of education are all things which may be measured or statistically quantified, but they do not readily convert into dollars and cents. Natural and social features which are commonly owned, such as air, water, and scenery, are often devalued and mistreated (Hardin, "Tragedy of the Commons"). These resources cannot be bought, sold, or traded. In the language of economics, damages to the commons are referred to as "spillover effects," or "externalities." Several attempts have been made to assess the economic importance of "spillover effects." Tidal marshes, for instance, have been valued in some studies (Gosselink, Odum, **et al.,** 1974) at as much as $80,000/acre income capitalized (or $4,000/year) based on food production, waste treatment, and life support value. Current market values of tidal marsh lands is, of course, considerably less. Air and water may similarly be given economic values; if they were, they would probably be used more wisely. These examples indicate the importance of common support resources. Management unit goals and objective baseline monitoring provide a good reference for the assessment of impacts upon support resources.

economic assessment

In addition to the hidden and support costs mentioned above, there are the very obvious economic costs which must be considered. Any impact assessment which ignores the economic consequences of the proposal neglects an essential component of human values. Economic assessment is a difficult tool to use and must be utilized with full knowledge of its limitations. It is especially valuable as an indicator of the costs of onshore support for offshore development. A comparison of these costs with the expected returns is a helpful criterion for the location of onshore development. Being consistent in what is measured on the positive and negative sides of the issue and evaluating economic effects at all stages of development are important in making an economic assessment. The economic changes associated with boom development do not reflect the full picture for the parish.

economic support

With the first announcement of offshore exploration, the parishes and local governments should begin to investigate the changes which may occur in their economies. They should estimate what role they might be able to play in this development given their goals and economic capabilities. Particular emphasis should be placed upon the following economic costs which may accompany offshore development.

1) **Social services.** The in-migration of workers during the development boom generates a need for expanded social services. Schools, hospitals, police and fire protection are immediately needed to accommodate the booming population. The need for large labor forces encourages this in-migration and, at the same time, inflates the value of labor. Inflation makes local attempts to meet the new demands even more difficult. General obligation bonds and increased property taxes aggravate the inflated economy of the local residents.

2) **Physical services.** The need for extended physical systems, such as roads, utilities, harbor space, or land, follows a similar scenario. The offshore operations must dispose of solid wastes and acquire large freshwater supplies. More opportunities exist in this case, however, for the community to pass the costs on to the user. Developers and new industries can be required to provide the utilities and roads necessary to service their own developments. Revenue bonds for physical improvements can also help subsidize capital budget projects. Some communities respond to economic strain by extending the city limits to add more land to the tax base. This is almost certain to encourage urbanization (the only use which can afford city tax rates), and thus stimulate a further, less-efficient extension of physical and social services.

3) The final major category of support requirements is found in the **mitigation of adverse impacts,** such as oil spills, water pollution, and inflation. Only a part of these costs can accurately be assessed from an economic standpoint, such as the cost of cleaning up a spill or of polluted water. Costs involving a decline in other sectors of the economy, such as fishing, may be only roughly inferred. Recent attempts have been made to offset costs by levying fines on polluters. The fines are intended more as a symbolic punishment, however, than as an actual assessment of damages.

funding methods

Local governments often have difficulty meeting the economic support requirements of large-scale development. Land, labor, services, or money can be in short supply when a development boom begins. In order to offset these shortages, the local government may resort to a number of funding methods. These methods relate to three basic fiscal problems which the area faces.

Getting the money. The community must first be able to get the money for sustained development. This is generally accomplished by taxes and bonds. Taxes are an unpopular yet effective way of raising money when properly applied. In many cases, they are initiated on the state level; for instance, income tax and sales taxes. Local government is able to levy real estate and property taxes, however, based upon the appraised value of the land. Taxation sustains daily needs of the community, but is poorly suited to the financing of boom development.

Converting Future Revenues to Present Worth. In order to raise funds necessary for larger projects, it is necessary to borrow money by bonding. In this case, the local government converts its future value and revenues into present worth. By selling bonds, the community can undertake large projects immediately. General obligation bonds are paid for by community taxes over long periods of time. Another form of immediate funding, the revenue bond, is paid for by those who use the facility. A toll road is a good example. A parish or community which does not have bonding ability is not able to get the funds necessary to accommodate the demands placed upon it.

Getting the Money to the Right Places. Distribution of wealth has been a difficult problem throughout history. To be certain that the revenue from taxes and bonds gets to the places where it is most needed, special districts and local improvement districts should be set up. Revenue sharing and grants can be based upon a formula which reflects the need for economic assistance related to offshore energy development.

The returns from an energy development project are often sufficient to offset the costs mentioned above. Revenue from taxes and the increased circulation of money in the area, however, do not catch up with the costs of development until many years after the project is started. If the area has insufficient economic resources, a weak tax program, or unrealistic growth plans, the costs may exceed revenues even in the long run.

techniques of assessment

The task of combining projected impacts—hidden, ecological, and economical—may be accomplished by a variety of techniques. Traditionally, plans have been evaluated by cost/benefit studies. If the economic costs are less than the economic benefits, the proposal is considered "feasible." Due to all of the non-economic costs which are generally neglected in an analysis of this sort, "feasible" may not be the same as "desirable." Recent attempts have been made to minimize this weakness by giving dollar values to things which do not generally lend themselves to that form of valuation.

benefits

OCS employment
other employment
purchase of support services
direct equipment purchase

costs

physical services
social services
social costs
mitigation of impacts

A similar technique for impact assessment is accomplished by the use of a weighted matrix to record and measure impacts. In the simplified matrix shown below, the proposed actions are listed on the top and potential impacts at the left. Each impact in the matrix can be given a value from one to ten based on its importance and a second value based on its magnitude in the specific case. These values, positive and negative, may be added together to give an overall picture of the consequences of the proposed action. The far right part examines the ways in which one impact can generate or be related to others. This second step rightly focuses on the interrelationships of complex environmental systems. Potential impacts are listed on both sides of the matrix and are evaluated for their influence on one another. (For a more complete list of potential impacts and uses of weighting, see Leopold.) The weak link in this process, as in the cost/benefit method, lies in assigning values to impacts which are difficult to quantify. On the other hand, the weighted matrix incorporates subjective values which might otherwise be neglected in a purely economic or scientific assessment. While both cost/benefit and matrix methods are a valuable index of whether or not a project should be done, neither of these techniques aid in the development of design alternatives to the proposed action.

A third technique of assessment lies in composing a graphic composite of projected impacts. The social and physical features of the environmental inventory are evaluated and mapped for their relative potential to be effected by a proposed action. Areas of the highest vulnerability are shown darker than those which are more tolerant. Then the baseline maps are overlaid. Darker areas indicate a composite of the greatest potential to be impacted, while lighter areas indicate the regions of least vulnerability. The advantage of this technique over the others is that it suggests design alternatives to the proposed action.

More advanced models are able to analyze several variables, such as cost, ecologic vulnerability, and circulation goals, at the same time. This technique is a valuable tool for discovering **how** the proposal should be done. In this way, the best alternatives may be discovered. The matrix and mathematica methods above are more directed toward whether, in the final analysis, the project is both feasible and desirable.

m – magnitude

i – importance

numbers are illustrative only

			actions				impacts					
							phys.		soc.		econ.	
			clearing	dredging	diking	draining	habitat modif.	subsidence	recreation	employment	property value	tax base
impacts	phys.	habitat modification	-10/10	-5/5	5/5	-8/10		-8/1	-2/1	-8/5	-1/5	-2/1
		subsidence	-2/2	-5/2	-5/2	-10/10	-8/2		0/1	0/1	-5/5	-5/1
	soc.	recreation	-8/5	-2/1	-2/2	-5/2	-8/2	-5/1		+5/2	-2/1	+4/1
		employment	+1/1	+1/1	+1/1	+1/1	+1/1	-2/1	+8/5		+3/1	+8/1
	econ.	property value	+2/5	+2/5	+5/1	+10/10	+5/1	-10/6	+8/3	+4/3		+2/1
		tax base	+1/2	+1/1	+2/1	+6/2	+1/1	-8/2	+5/1	+10/5	+8/1	

public participation and review

Public participation is recognized at all levels of government as an essential feature of resource management. The involvement of the general public has two basic objectives. First, under the democratic system, the public should develop, review, and change the programs and decisions of its government. People are the substance of democracy, and ideally, they are the government. Managing environmental resources raises conflicts among various users of the environment which are best dealt with in the public forum.

The second objective of public participation is to increase the effectiveness of management programs. An informed people will better understand the environmental problems in their parish, the needs of the coastal zone as a whole, and the intent of management programs. In a recent study, entitled "Citizen Perception of Coastal Area Planning and Development," the lack of public awareness of coastal problems was clearly brought out. "A majority of Louisianans have no knowledge of coastal zone management or planning. . . . Half of all Louisianans are not conscious of the problems of the coastal zone (e.g., pollution, land loss, saltwater intrusion)" (Lindsey, **et al.**, 1976). These findings point out the need for greater public involvement in the planning process. People cannot be expected to consider or to respond to important plans of which they are not aware.

While these objectives are easily stated, they are not easily accomplished. The general public does not feel involved in government affairs at any level. Those who trust local government do not trust higher levels of government. Those who trust higher levels have little faith in local governments. Many have no faith in "the system" at all. Worst of all, almost no one seems to pay anything more than lip service to "the people." This is a harsh picture of the contemporary scene, but it demands an answer to the question, "What does public participation really mean?" Only when this is answered can an effective program begin.

principles of public participation

The following observations on the nature of public participation are a less than ideal view of the democratic process. This realistic view lays a firm foundation, however, for the involvement of "the people" in a meaningful environmental management program.

1) "The People" means **all** people. People are the substance of democracy. A recent study showed that the elderly, rural, black, and poor had less awareness of coastal issues than others in the coastal zone. When groups of people are left out, problems are compounded and community goals have less relevance (Lindsey, **et al.**, 1976).

2) "The People" are made up of leaders and followers. Leaders sanction the project for their followers. They generally include clergymen, politicians, heads of special interest groups, clubs, and businesses. An individual who is not conventionally thought of as a leader can also have a significant following. It is essential that a public participation program include as many of the local leaders as possible.

3) Planners and politicians must **understand** and **accept** the basic qualities of the people, their lifestyles, traditions, and values. It is a mistake to start with utopian visions of reason, consensus, and the democratic process. Accepting things as they are does not imply complacency, but a basic respect for the people and their values. As a starting point, it leads to an understanding of those things in the people which promote the democratic process and those things which tend to obstruct it.

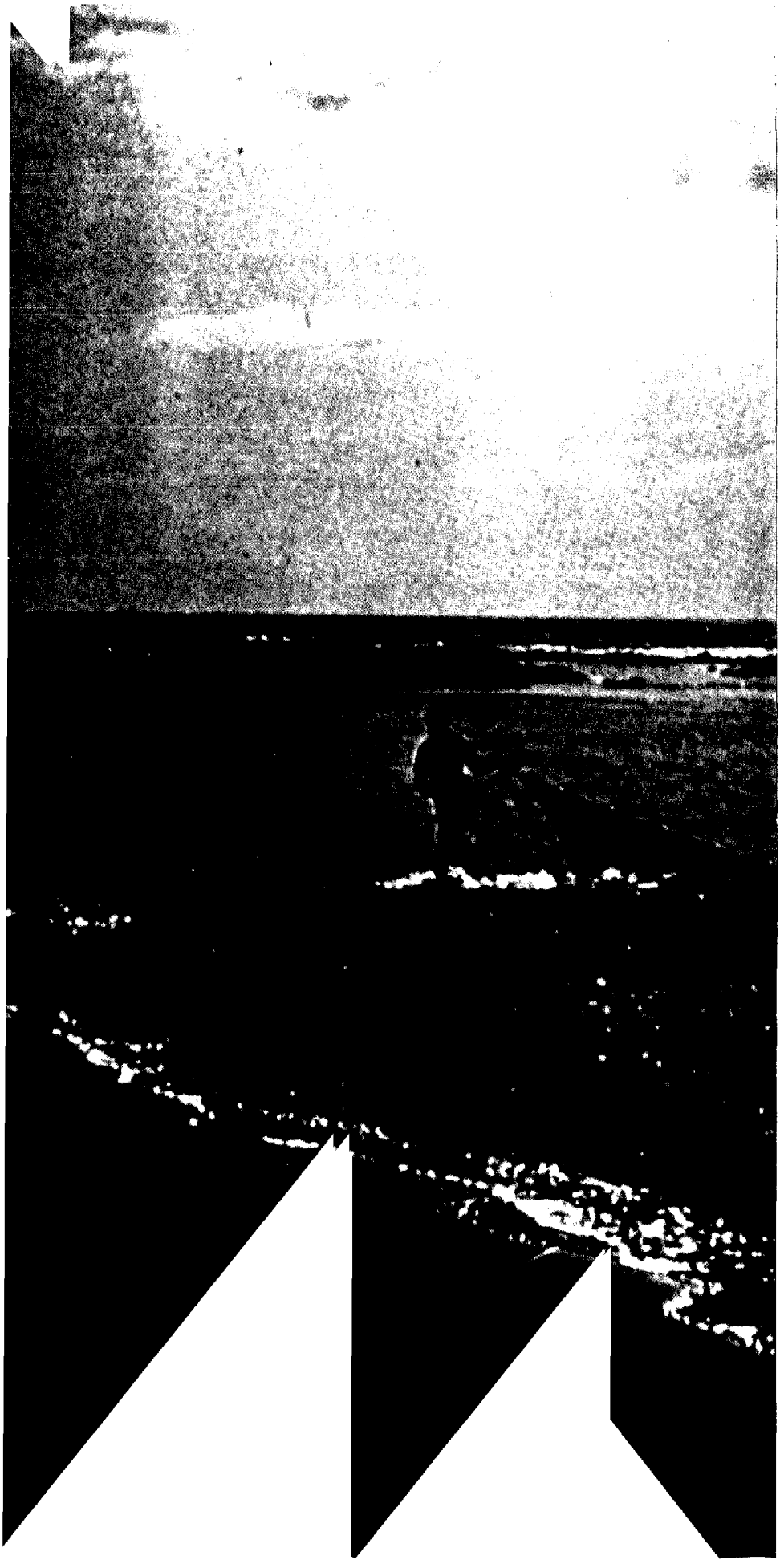
4) The essence of public participation is controversy. If a consensus existed, there would be no need to have a management program. Interaction and argument between different users of the coastal area can lead to change, compromise, and creative alternatives.

5) People generally act out of self-interest. They defend their use or view of the coastal area against conflicting claims. The democratic process is often self-serving rather than altruistic. Once this is recognized, the organization and development of a public participation program can be effective. If the people are convinced that their basic interests, such as money, or values are at stake, they will participate. Likewise, if they see the program as an opportunity to further their own interests, they will participate. In the real world, people often do the right things for the wrong reasons. The organization of a public participation program depends upon the use of "wrong" as well as "right" reasons.

6) A number of pitfalls exists which may destroy attempts to involve the public in coastal resources management. First, the program should not imply that local groups can't do their own work. The program should avoid usurping functions carried out by existing groups and agencies. Rather, it should be a forum for the interaction of those groups. Secondly, local groups may object that the coastal resource management program is competing for scarce funds and time. A public program should recognize that people have many existing loyalties to friends, church, social groups, and so on. It should be stressed that participation in the program is in the best economic and political interests of the people as individuals, as groups, and as a community.

The conventional techniques for achieving public participation, such as public education, advocacy planning, opinion surveys, public hearings, and workshops, can be more effective and less frustrating if the considerations above are kept in mind.

Public review is ordinarily sought only as a response to a final impact assessment or program proposal. This limited involvement should be expanded to include the development of goals for management units, the operation of the management programs, and the reassessment of goals and programs. A creative government will seek to engage and inform the public in as many of its decisions as possible.



conclusions

The question always arises, "Why must any regulation exist at all?" According to this argument, the man who owns the land has exclusive rights over its development. If nothing else, this handbook should point out the interdependence between one piece of land and those surrounding it. The man downstream is seriously affected by water pollution. The fisherman is seriously affected by impacts upon aquatic ecology. Regulations protect the rights of one property owner against damages by another. More importantly, this protection is preventive. A court award of damages is a far more wasteful process than the anticipation and avoidance of damages by constructive planning.

The decisions which result from the planning process will be as thoroughly studied as possible within the limitations of time and funds. In addition to the traditional inputs of private interests and legal precedents, the planning process should embrace public review, scientific data, community goals, and professional analysis. When management principles are applied at the early stages of project design, the feasible can be united with the desirable. In this way, alternatives may be seriously evaluated, avoiding costly yes/no decisions after the design process is completed. Decisions which lack this solid foundation do not serve well the individual, the community, the economy, or the land.

The value of the planning and impact assessment process lies not only in its goal of systematically coordinating human needs with environmental conditions, but also in relating man more closely to his environment and neighbors. The purpose of coastal resource management is not merely to preserve this area or to develop that area, to maximize benefits and minimize losses, but more importantly, to enable man to act out of knowledge and empathy for his fellow man and the rest of nature.

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